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Europe/Latin America Report

SCIENCE AND TECHNOLOGY

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18 DECEMBER 1986

EUROPE/LATIN AMERICA REPORT

SCIENCE AND TECHNOLOGY

CONTENTS

LATIN AMERICA

/12223

WEST EUROPE/ADVANCED MATERIALS

APPLICATIONS OF NON-OXIDE CERAMIC MATERIALS EXAMINED

Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 437, 10 Aug 86 pp 8, 9

[Text] In the field of "new materials," "new ceramics," that is, non-oxide ceramics, are particularly interesting since availability of the basic raw materials for this field is almost unlimited. Moreover, the newest shaping and manufacturing techniques for components are linked to the new ceramics.

Following the initial restriction of non-oxide special ceramics to specific fields of application, the importance and industrial application of these materials has steadily increased. Non-oxide, special ceramic materials possess properties that are quite useful in many technological fields: hardness, high stability even at high temperatures, resistance to abrasion and corrosion, as well as thermal and electrical conductivity and insulation capacity. However, these advantages are countered by significant disadvantages such as brittleness and expensive techniques for fine machining of components. This machining is currently possible only with diamond tools.

Extremely different manufacturing techniques enable the production of components which differ from one another in density, texture, type and quantity of sintering devices, and, consequently even in their properties. These properties, specific, on the one hand, to the material, and influenced, on the other hand, by the special manufacturing technique, are crucial to the range of application of special ceramic preformed parts.

Pure, sintered silicon carbide (SiC) stands out for its high degree of hardness, good corrosion resistance, good stability under high temperatures and resistance to oxidation as well as high thermal conductivity and resistance to thermal chocks. These properties also make SiC interesting as a material for machinery construction, particularly under corrosive and abrasive conditions.

Because of its high degree of hardness, boron carbide is extremely resistant to wear and is superior to other mechanically resistant materials under the most severe radiation conditions. Because of its low specific gravity (2.51 g/m^3) and high modulus of elasticity (440 GPa) sintered B_4C is recommended as armor plating material for lightweight constructions, such as those used for aircraft. Given the high neutron absorption cross-section of the B-10 isotope and its melting point of approximately 2,450°C, boron carbide is

particularly suitable as an absorbing material. That is why it is used as a control, regulation, and shielding material in nuclear power stations. Among the non-oxide, solid, special ceramic, nitride materials, those used commercially are mainly silicon nitride, boron nitride and aluminum nitride. These nitrides are ceramic insulating materials which have created a wide field of applications, particularly as far as the hexagonal boron nitride and aluminum nitride are concerned. On the other hand, silicon nitride demonstrates exceptional resistance to abrasive wear, even in extreme conditions, while BN and AlN show good resistance to corrosion.

Among all non-oxide special ceramic materials, thick silicon nitride materials show the highest stability and highest comparative fracture resistance. In sensitivity to wear through cavitation, they are superior to all other materials; therefore, their use in ultrahigh pressure relief valves--for example, for coal gasification and coal liquefaction--is to be recommended. Silicon nitride materials in the form of small blanking dies have also proved to be exceptional in metal cutting techniques. Components of hexagonal boron nitride stand out for their excellent resistance to thermal shocks in addition to their good corrosion resistance. Therefore, boron nitride components are destined to be used for horizontal continuous casting of molten steel.

The commercial application of pure aluminum nitride components is still in the development stage for the time being. An important future application might be for substrate plates for high-performance electronics. In this case, good use is made of its high thermal conductivity and high electrical resistance.

Titanium diboride has superior suitability as a cathode material for aluminum electrolysis in the dry way thanks to its good chemical stability against liquid cryolite and aluminum, high melting point, and exceptional electrical conductivity.

In this case, also, the high modulus of elasticity of titanium diboride is exploited for the production of armor plates.

The determination of which material offers the best characteristics for a specific application must be made in each individual case based on its special conditions.

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WEST EUROPE/AEROSPACE

NEW VARIABLE THRUST, CARBON-CARBON COMPOSITES ON ARIANE 5P BOOSTER

Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 21 Aug 86 p 7

[Text] Frankfurt--The most efficient configuration of the future Ariane 5 rocket (Ariane 5P) with respect to thrust, reliability and economic feasibility will consist of an H120 first stage with the HM60 Vulcain cryogenic thrustor, which will be supplemented by two solid-fuel booster engines. In addition, depending on the rocket payload, there is an L4 second stage that will function with storable propellants, or an H10 second stage that is to burn cryogenic propellants. The boosters are being developed according to the projection of the French Information Center for Industry and Technology in Frankfurt, under commission to the French space agency CNES (National Center for Space Studies) of the French company Societe Europeenne de Propulsion (SEP), together with the Italian company SNIA-BPD. Using these boosters, the Ariane 5 will be able to put the Hermes orbiter into its planned orbit, thus initiating manned European space flight. The launch of Ariane 5 is being planned for 1994.

The new boosters have a diameter of 3.1 meters, are 19 meters high and weigh 183 tons, of which 158 tons are apportioned to the fuel. Although the boosters are thus smaller than the solid-fuel boosters of the American space shuttle, which measure 3.7 meters in diameter and 45.46 meters in height, their variable thrust between 3.5 and 5.5 meganewtons, as well as their propellant nozzles, which swivel polydirectionally at six degrees, make these boosters more versatile, according to French circles.

For the sake of reliability, weld joints have not been used in construction. The front and rear hoods are molded from panels or rolled rings, the segments are similarly produced from rolled rings through flow turning and then processed true to size. In the opinion of French experts, this production method has several advantages:

--The absence of weld joints provides a homogenous substance structure.

--The segments are entirely flawless, since a potential flaw would have to be noticeable during the flow turning process.

--The small number of steps makes economical production possible.

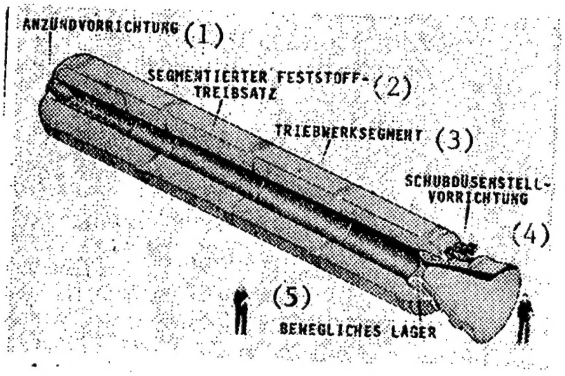
--European industry is very experienced in flow-turn technology. What is new is the development of a process for simultaneously shaping a mounting flange.

Both technical and economic reasons are behind the use of a low-alloy steel instead of the previously standard maraging steel. For heat insulation, the segments are layered on the inside with silica-doped, high thermal capacity EPDM rubber, which is intended to be vulcanized on the spot. This process has reportedly already been successfully used for France's high-power military propulsion units, which were developed by Societe Europeenne de Propulsion (B.P. 37, Le-Haillan, F-33165 Saint-Medard-en-Jalles).

The parts of the propelling nozzle that are subject to high thermal stress are made of newly developed carbon-carbon composite materials (multidirectional carbon fibers in a carbon matrix) that are reportedly more efficient and easier to control in terms of production technology than the previously standard phenolic plastics. For example, its resistance to temperature is reportedly assured by the fact that it is subjected to temperatures during production that are equivalent to those during operation. Moreover, the ablation properties of carbon-carbon substances effectively prevent the formation of gaseous pyrolytic products within the materials. Parts subject to less stress are wound from fiber-reinforced phenolic plastics.

The computer-aided propelling nozzle control system is also reportedly designed with an eye to maximum security and reliability. A turbopump unit, driven by a separate gas generator, provides the necessary hydraulic energy.

Figure 1. The A5P Solid-Fuel Booster



Key:

1. ignition
2. segmented solid-fuel propellant
3. fuel segment
4. swivel nozzle assembly
5. mobile mount

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WEST EUROPE/AEROSPACE

DISCUSSION OF ESA HERMES, HOTOL, SAENGER PROPOSALS

Frankfurt/Main FRANKFURTER ALLGEMEINE ZEITUNG in German 12 Jul 86 p 7

[Article by Anatol Johansen: "A German Shuttle for Space?"]

[Text] Cologne, 11 Jul--A dry sentence, a minor sensation: "The German delegation presented an MBB-study for a two-stage space transportation system, called Saenger, which, together with HOTOL, the delegation regards as a contribution for a joint technology study. The ESA council took note of these statements (HOTOL and Saenger) and the additional information provided by the two (German and British) delegations." The sentence appears in the minutes of the most recent session of the ESA council, the highest committee of the European Space Agency, of 25 June 1986, and it states that ESA was apprized of a new German proposal for a space transportation system called Saenger (after the rocket pioneer Eugen Saenger).

Following the French, who favor a small, European space shuttle (Hermes), for a crew of four to six men, and the British, who are proposing in HOTOL a hypersonic aircraft suitable for space flight, using a new type of propulsion, the Germans have now put forward a plan for a European space transporter with Saenger. Their proposals lie somewhere in the middle between the technologically relatively unpretentious French machine, which is to be built under the leadership of Aerospatiale, and the British design HOTOL, which looks far into the future. Put simply, Hermes is only a large, winged return capsule, with no power of its own. According to the French proposal, Hermes (18 ms long, with a wingspan of 10 ms and a maximum total weight of 16 tons) is supposed to be ready for operation by the mid-1990's and be launched on the new Ariane 5 rocket, which is also under development. This space glider is equipped only with attitude control jets, which can change its flight attitude in space, but, unlike the U.S. space shuttle, it does not have its own rocket propulsion. So it would be no more than a type of payload for the Ariane 5 rocket.

As proposed by the British, the HOTOL space shuttle, whose dimensions far exceed those of Hermes, is completely different. Its projected length is 62 ms, and the wingspan is to be 20 ms. Maximum allup weight, at just under 200 tons, is to be 10 times more than that of Hermes.

The significant difference, however, is that HOTOL would be equipped with its own propulsion, which would overshadow everything that exists today in the way

of engine systems for air and space travel. This motor, which would have to be developed completely from scratch, is intended to function both as a jet engine in the earth's atmosphere and after that as a rocket engine in space. In the earth's atmosphere, up to an altitude of about 30 kms, the engine could draw the oxygen needed for combustion from the environment. At higher altitudes it would use the liquid oxygen carried in tanks for combustion. Until now, noone has ventured to conceive of a propulsion system of this type. Hybrid engines, which work equally well in the earth's atomosphere and in space, do not exist anywhere at the present time. In the event that HOTOL were actually to be built, the British would be faced with an enormous amount of development and test work.

The space vehicle proposed by the British would not be launched vertically like Hermes, but take off horizontally on a special launch sled. HOTOL would ride on this sled over a normal airport runway. After attaining a high initial velocity, HOTOL would then lift off, and the sled would remain behind at the end of the landing strip. The space transporter's landing gear could then be made substantially lighter, because a large portion of the total weight of 200 tons would be taken up by the fuel. The British space vehicle would weigh only 40 tons when it lands.

British Aerospace sees a particular advantage to their proposal in the fact that HOTOL, which has about the same dimensions as the Concorde, can not only carry satellites and other payloads into space at one-fifth of the cost involved today in using the American space shuttle. British Aerospace stresses that one conceivable version of HOTOL is a hypersonic passenger airplane, which could complete the London-Sydney route, for example, in 2 hours.

The German Saenger proposal lies in the middle between Hermes and HOTOL. The proposal, which was drawn up by Messerschmitt-Boelkow-Blohm (MBB) and the German Air and Space Travel Research Institute (DFVLR), would like to go beyond the possibilities of Hermes on the one hand, but, on the other, circumvent the difficulties of the British proposal, for which a completely new propulsion system would have to be developed. Saenger is designed as an airplane-like, two-stage space transporter system. The new space vehicle would bear a remote resemblance to a biplane and weigh close to 400 tons. The delta-wing lower stage is to have a length of 50 ms and a wingspan of 25 ms and weigh between 100 and 150 tons upon landing. Equipped with turbo ram jet engines, the first stage would take off horizontally like an airplane under its own power and reach about six times the speed of sound at an altitude of about 30 kms. There the rocket engine of the second stage, which is also winged, would ignite (length: 25 ms, wingspan: 12 ms, total weight: 50 tons, including 35 tons of fuel) and carry this stage farther into space. The first stage would return to earth and land at an airport like an airplane. The same thing would happen with the second stage following completion of its mission in space.

In this way the German proposal would circumvent the difficulties of the HOTOL project: in the earth's atmosphere air-breathing engines would be employed and in space, rocket engines; there would be no necessity to develop an expensive new type of propulsion technology which would be used in both the

earth's atmosphere and in space. At the same time, Saenger's lower stage would be almost like a hypersonic passenger airplane, with speeds similar to those of HOTOL. Saenger's second stage would also carry a substantially greater payload into space than would be possible with Hermes. At MBB there is talk of between 2 and 12 passengers and an additional payload of up to 4 tons. Payloads could be carried into space close to the earth at one-fifth of the cost that would be involved using the Ariane 5 Hermes rocket.

All the proposed space shuttle systems, which would be carried out within the framework of ESA with only European collaboration, would have one advantage. For the first time they would provide Western Europe with access to manned space flight, independent of the superpowers, and strengthen European autonomy in space. In addition, Hermes on the one side and HOTOL and Saenger on the other would not necessarily have to infere with one another, because, while the French are looking to have their equipment ready for operation by the mid-1990's, HOTOL or Saenger could not be launched for another 10 years at the earliest. Hermes not only has a time advantage. Because of its comparatively uncomplicated technology and its relatively modest dimensions, the French space glider would also be the least expensive of the three proposals. But even in the case of Hermes, development costs in the range of between DM3 and DM5 billion are being discussed, which experience shows could increase considerably in the course of development. Against this, at least this amount would have to be found for the technologically costly British and German proposals.

HOTOL and Saenger, however, are pursuing considerably more far-reaching goals than Hermes. They would be able to carry heavier payloads into space at more favorable prices than the French space glider. And what is ever more important: they would give Europe access to hypersonic air traffic and space travel simultaneously, which the United States has officially set its sights on as the next major research goal: Last spring Washington released more than $1 billion (DM550 million) for the development of a "transatmospheric vehicle."

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WEST EUROPE/BIOTECHNOLOGY

EC COMMISSION ISSUES PAPER ON COMMUNITY BIOTECHNOLOGY GOALS

Bonn TECHNOLOGIE NACHRICHTEN-PROGRAMM INFORMATION in German No. 328, 20 Jun 86 pp 2-16

[EC Commission "discussion paper" entitled: "Biotechnology in the Community: Stimulation of Agricultural and Industrial Development;" date not given]

[Excerpts] Introduction

Paralleling the "big debate" on the future of European agriculture (Footnote 1) ("Perspectives on the Community Agricultural Policy," (Green Book) KOM (85) 333, July 1985, which led to the report KOM (85) 750 "Future of European Agriculture" of Dec 1985) is the increasing discussion of biotechnology. The topic is subsidy, utilization, and transformation of the latest progress in our understanding and control of living matter and systems and, at the same time, development of appropriate regulations for the protection of man and environment from unforeseen dangers. Because progress brings with it opportunities and threats and also challenges throughout agriculture, science, technology, industry and environmental protection, that is the challenge of exploiting the whole range of new technologies and of making sure at the same time that the risks connected with it can be monitored and contained.

This discussion paper:

-complements existing and proposed research programs, especially the ongoing and planned programs for biotechnology, agricultural research, and foodstuff technology, and proposes their utilization;
-complements existing agricultural policy and supports the development of the agricultural sector;
-does not yet contain a comprehensive and detailed definition of the individual agro-industrial projects and activities to be subsidized, but rather;
-focuses on the creation of a framework for subsidy and promotion and shows how biotechnology could contribute to the opening of new possibilities which could be useful both for agriculture and biotechnology of the Community, as well as for adequate protection of the environment.

By creating the prerequisites for free competition and through its available political measures, the Community can promote a more efficient cooperation between European agriculture, industry, and science. New forms of production are being developed, and Europe's farmers, technicians, and industrialists have the necessary knowledge along with the capability to apply it.

The most promising inventions are not necessarily recognized at ministries and offices of the Commision. However, the public authorities, particularly the Commission, can and must create a framework which, on the one hand, offers incentives to motivate farmers, technicians, and industrialists to cooperate for the declared needs of the Community and especially for those of the market and, on the other hand, contains appropriate regulations assuring adequate protection of man, animal, and environment without hindering further development.

Biotechnology and Agro-industrial Developments in Europe

The activities concerning "biotechnology in the Community," which were outlined in the report presented to the council by the Commission in 1983, contain elements for the support of the proposed activities.

The elements of this plan are:

- Research and training;
-Concerted action;
-Access to raw materials of agricultural origin;
-Control mechanisms;
-Intellectual property rights in the field of biotechnology;
-Demostration projects.

Important activities already are underway in the first five of the aforementioned areas. For the themes of research and training and concerted action, a biotechnology research and action program was established for the period from 1985 to 1989 with an initial budget of 55 million ECU [European Currency Unit]. A substanctial portion of the research has significance for the agricultural and nutritional sciences sector, whereas its concerted action will contribute to the promotion of broad international cooperation under a joint administration, which is necessary for the agro-industrial development.

When the program was adopted, the council determined that it would be subject to revision during 1986. The Commission soon will propose to raise the amount of funds to correspond with the new framework program. Although this paper concerns demonstration projects, it should not be overlooked that the strength of our research and training activities and the efficiency of our concerted action both at a community level and between member states is of fundamental importance for our competitiveness in this technology, which is based on knowledge and involves overlapping disciplines and widespread areas of application. An expanded program can be justified both by the documented success of our program in the area of molecular biotechnology and by the growing future demand, for example, for concerted action, support measures, and infrastructure in all aspects including databanks, information systems, and related developments, where the total size of the demand has just become obvious. The Commission has proposed new regulations for sugar and starch which would make these agricultural raw materials available for use in the non-food industry of the Community at prices which are close to those enjoyed by the main competitors of our industry. These changes have the fundamental importance of making investment activities for industrial projects in the Community attractive, especially those which are of special interest for agriculture because of increased demand for sugar and starch. For this reason it was a big

step ahead for European biotechnology, agriculture, and industry when the council passed the new regulations on 25 March 1986.

The offices of the Community are developing a joint formula for regulation mechanisms which will make it possible to base agro-industrial development on the entire common market and to guarantee at the same time adequate protection for man, animals, and the environment. The plan is to propose a framework regulation in the near future and to take the initiative to promote harmonization on an international level also. The regulations and procedures to be developed willdeal with the use of organism, working methods, resulting waste materials, and accidents.

On the issue of intellectual property in connection with biotechnology, it is becoming more and more urgently necessary to tackle the problem of the patent ability of higher organisms and--as far as new types of plants are concerned --the overlapping of other forms of protection, especially those involved in breeding operations. This involves Important political problems which are currently being examined by the Commission.

Important action was delayed only on the demonstration projects (or rather, at this stage, the pilot projects and exploratory activities), the sixth element of the Commission's biotechnology plan.

Demand for Pilot Projects and Related Preparatory Activities As a Pointer for Agro-industrial Development.

Several factors now seem to make it feasible to consider pilot projects and related preparatory activities in the area of biotechnology. Among these factors are:

-the need to demonstrate new possibilities and directions for the development of European agriculture;
-recognition by investors and industrialists of the fact that some types of innovation in biotechnology can only be successful in the long term and without guarantees;
-the requirement announced by the European Council that environmental protection policy must be a substantial component of trade, industry, agricultural, and social legislation;
-the requirement to form a basis for the exact scientific assessment of investment possibilities;
-the requirement to demonstrate that--provided these factors are adequality taken into account--a "New Deal" is possible for European biotechnology as a result of the progress made in research and the initiatives to be taken by the community for the improvement of relevant conditions.

The word "pilot" is used here for reasons of convenience: the projects should be the immediate consequence of the results already obtained and now available for examination or confirmation under realistic agricultural and industrial conditions (provided adequate measures for health protection and environmental protection are taken). Among these prospect activities could be:

-Purely "demostrative" projects which continue (following the well established methods of ongoing Community programs for energy demonstration projects successful R&D (including pilot projects) and immediately precede commercialization: These would still correspond to specific needs such as testing on an industrial scale and assessment of the commercial prospects; Pilot projects for testing and improvement of results prior to general application; these projects could thus also take the form of "feassibility studies" or "exploration studies."

The preparatory actions must consider any relevant previous incompatibility of projects as well as a cost/result analysis including environmental input costs.

The following are examples of areas where these projects could be subsidized:

-Greenhouse and field trials with new breeds at the research stage in order to test their suitability for larger series, especially with plants which are obtained totally or partially through new techniques of gene transfer and somaclonal modification, as well as through plants with new properties due to mycorrhizae, or plants which were developed thanks to the low initial expenditure required of test or for industrial processing;
-Planting on a commercial scale of those new breeds which have already shown suitability in small experimental series, to test their agronomic performance, their resistance to parasites, and so on, under various practical and cost effective conditions;
-Survey of resources within the Community according to soil quality and climatic zones, in order to pinpoint suitability for alternative plant cultivation (use and improvement of the new soil map which was established within the framework of the agricultural research program, as well as the FAST "SYRENA" studies regarding the long term use of renewable natural resource system);
-Studies to clarify the extent to which information technology can be utilized in all areas of agriculture, including (but not limited to) improved productivity;
-Tests regarding systems for complete harvest, separation [of the plant component], and processing at the farm or on the district revel: development of processes for the utilization of all plant components and their preparation for subsequent processing, for example, the gathering of low quality wood and other pulp fragments and their preparation for hydrolysis;
-Tests with new systems for year-round use of agricultural products, for example, multipurpose fermentation and processing systems which are able to process a variety of raw materials and yield a high number of products;
-Gests of new biotechnical process for the refinement of agricultural products, especially of those components which are usually not used;
-Tests with new biotechnical processes for the refinement of animal products, for example, the improvement of productivity in pigbreeding; modification of milk proteins through enzymes in order to obtain new functional properties, and a broad range of further possibilities in the entire animal breeding and animal products sector;
-Pilot projects for the modification of foodstuffs technologies and other processing technologies through new biotechnological processes for the use of domestic rather than imported agricultural raw materials;

-Assessment of new processes based on biotechnology for the manufacture of alternative chemical products based on carbohydrates instead of fossil hydrocarbons ans assessment of their compatibility with the environment;
-Tests with biotechnological processes where natural lipids are used as raw materials for the manufacture of non-food products;
-Development of a generic methodology for the assessment of environmental compatibility of projects or programs (in accordance with the principles described in guideline 85/337). This refers especially to the possible consequences of the utilization or--to an greater extent--to the deliberate release of genetically modified organisms in to the environment.

The following could be of special interest:

-Projects of special importance for the problems and possibilities of the agriculture of the Mediterranean area or of particularly disadvantage areas, where biotechnology could be helpful;
-Projects which show how little known plants of potential importance could be cultivated in a commercially significant manner for the tasks and requirements described in the paragraphs above (for example flax, bitter lupine, Cuphea, jojoba, guayule, medicinal plants, and many others).

The use of biotechnology and other advanced technologies should generally be combined in the projects following conventional processes and techniques with the aim of manufacturing products under commercially justificable conditions while making a contribution to the goals of cost reduction, diversification, marketing and quality, new markets, and pollution control. Therefore, they must have a good scientific and economic foundation, and must take into account the importance of environmental protection.

The Community will only make a partial contribution in order to give an incentive for overcoming initial threshold costs. The calls for proposals will refer to precisely defined themes with the corresponding evaluation criteria.

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WEST EUROPE/BIOTECHNOLOGY

FRG STUDIES REFORM OF BIOTECHNOLOGY PATENT LAW

Bonn TECHNOLOGIE NACHRICHTEN-MANAGEMENT INFORMATIONEN in German No 437, 10 Aug 86 p 9

[Text] European patent law has thus far been unable to keep pace with the rapid development in biotechnology--and its research results which are ripe for application. On national and international levels attempts are now being made to adapt the patent law to this development through appropriate reforms. The Max Planck Institute of Munich is making a considerable contribution to efforts concerning foreign and international patent rights, copyrights, and competition rights: the patent law researchers in Munich have outlined reform proposals in several studies.

Altogether these reform proposals are aiming at extending and easing patent protection which so far has been applied restrictively in bioengineering. Thus, in the future, it will be possible to obtain patent protection in all countries for microorganisms and similar results of microbiological research (cell lineage, plasmoids, monoclonal antibodies,) as well as for macrobiological discoveries (new species of plants and animals) if these meet the usual requirements (originality, inventive merit, commercial applicability, and sufficient information). The depositions on microorganisms recognized so far for patent protection in this field should be sufficient to complement production patents. Patent protection should also include the animal breeding field, which has been completely ignored up to now. As far as plant breeding is concerned, it should be possible in the future--after the abrogation of the ban on double protection--to choose between variety protection or patent protection or to claim both. Finally, the Max Planck Institute of Munich is proposing a novelty grace period of 1 year which would make it specifically possible for the researcher to give written or verbal reports within this period on the results of his research without excluding future patent protection.

Prof Dr Friedrich-Karl Beier, managing director of the Max Planck Institute for foreign and international patent rights, copyrights and competition rights, and Dr Joseph Strauss, scientific spokesman for the institute, are supported in their reform proposals by their legal comparison of patent protection for biological discoveries in different countries, primarily in the United States and Japan.

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WEST EUROPE/COMPUTERS

FRG INSTITUTES EXAMINE VARIOUS ARTIFICIAL INTELLIGENCE FIELDS

Frankfurt/Main DIE UMSCHAU in German No 9, Sep 86 pp 462-465

[Article by Heinrich Buecken: "Special Research Field of the German Research Association: 'Artificial Intelligence'"; first paragraph is DIE UMSCHAU introduction]

[Excerpts] The Federal Government will spend more than DM200 million from 1984 to 1988 for "artificial intelligence" research. During the same period, it will make available an additional DM100 million to the German Research Association for the promotion of basic research in the field of information technology. In the past, scientific and business authorities had urgently stressed the need to catch up in that field because, particularly in the United States and Japan in view of the high importance of artificial intelligence for national economies, extremely large amounts of money had been made available for long-term research programs (in Japan alone, DM1.3 billion for the development of the fifth generation computer, the "artificially intelligent one"). The German Research Association has gone one step farther and created a special research field, "artificial intelligence," which started work on 1 January 1985. DIE UMSCHAU visited Prof Peter Deussen, Head of the Computer Science Institute I of the Computer Science Faculty at Karlsruhe University and spokesman for the special research field, to inquire about research projects.

The following are the individual research fields:

Deductive Systems--Designing of systems for automated proof of mathematical theorems and of systems for symbolic calculation.

Expert Systems--Development of systems that contain the knowledge from specific fields, make this knowledge available to the user in conversational mode, and draw original conclusions.

Natural Language Processing--In sufficiently limited fields of knowledge it is now possible for computers to understand texts in natural language and to give answers in natural language with the use of expert systems.

Image interpretation--Identification of definite objects in pictures as well as description of their mutual relationship.

Robotics--Control of autonomous robots (two-armed type) on the basis of measurements taken in their environment.

Software for Artificial Intelligence--Unification of the LISP and PROLOG languages; development of tools for the design of expert systems; further development and improvement of PROLOG.

These subjects are being treated by four different institutes in three different locations: Karlsruhe University with its Computer Science Institutes I and II (Professors Deussen and Rembold) and its Institute for Machine Tools and Industrial Technology (Professor Weule); the Fraunhofer Institute for Information and Data Processing in Karlsruhe (Professors Nagel and Syrbe, Dr Steusloff); Kaiserslautern University with its Computer Sciences Department (Professors Avenhaus, Madlener, Richter, and Siekmann); as well as Saarbruecken University, again with its computer department (Professor Wahlster).

Deduction Systems

Two large projects are under development within this framework, the "automated proof" project and the "term replacement systems" project.

The activities relevant to "automated proof" were started in Karlsruhe back in 1976 by Professor Siekmann.

The programming language LISP, developed especially for artificial intelligence, is used to implement the theorem proving system. Based on the resolution principle, an extensive proof system in LISP--with a size of 1.5 to 2 megabytes--is ready in Karlsruhe and Kaiserslautern. This is the core of the "logic" machine. What is still missing, among other things, is the automation of the proof principle for complete induction, which is being worked on at present.

The automated proving system is to be applied, for example, in the field of program verification. To write a program, its specifications must be present. These may be formulated with the help of functional logic. The program text and the specification allow the creation of the so-called verification conditions which, if they prove to be right, state that the program fulfills its specification. A generator for verification conditions is currently being constructed by a colleague of Professor Deussen.

Are practical applications already emerging? Professor Deussen: "There are some difficulties at present since even in quite simple programs verification conditions are extremely complicated and very long. I hope that in the near future we will be able to carry out practical program verification in a field where things are simpler, namely, in software for railway signaling technology. In this way, we will be able to accumulate experience. If some breakthrough is successful and we see that it works, then a series of further activities will be set up immediately, of course."

Another theme in this project is proof transformation. Rebuttal proofs are usually difficult to read. Whenever a proof is found, it should also be translated into natural language. Even this takes place by means of proof

transformation. In this case, the calculation of "natural closure" plays a role that was discovered by the logician Gentzen.

A long-range objective that Professor Deussen has set in connection with these activities is the completely automated "full proof" of a small mathematical textbook. With the proof machine, this target is a little closer. However, something more is necessary, above all the knowledge of the mathematician's approach and empirical experience. If this is not in place, "the proof machine will kill itself searching," which means that it will open such broad search fields that proofs will become practically impossible. Therefore, these search fields must be restricted in order to be able to reach the target, and this is done through the empirical knowledge, which must somehow be collected and encoded and which controls the proof techniques applied.

The second project being treated in the field of deduction systems is the "term replacement systems." For this purpose, the following has to be kept in mind: There are rules according to which the transformation of terms takes place. Great attention is now devoted to this field, because the application of these techniques and methods will make it possible to perform calculations in areas other than those of the usual numbers. Numerical calculation with a calculator may lead to great errors, as is generally known, because of rounding effects, while the techniques found through the term replacement systems make it possible to perform an exact arithmetic. A special task in this connection is development of termination criteria. It is important that these processes stop after a finite number of steps. Professor Deussen: "A program that does not stop is of no use to us." The "term replacement systems" project is being worked on at Kaiserslautern University.

Expert Systems

Opinions on expert systems still vary widely. According to Professor Deussen, an expert system is characterized by the fact that it is able, after obtaining a result, to inform the user in a sufficiently clear and convincing way, why it has reached this result. The system is not particularly helpful to the user if it simply reveals the thousands of steps which were necessary to reach certain results, it must use these steps to formulate more important "comprehensive" steps which are understandable to the user and appear plausible. This is done by the so-called explanation components, which are perhaps the most important components of an expert system. Professor Deussen: "Without this part, almost anything is an expert system. Every program would be one because it is an expert in its field. It is essential that the expert system draw conclusions independently and can express roughly how and why it came to such conclusions." Well known expert systems are diagnostic systems for medical use or for motor vehicle engineering. In chemistry, an effort is being made to derive the structural formula of a substance from the total formula using additional knowledge, from spectroscopy, for instance.

The expert system in Karlsruhe (Professor Weule) deal with the planning of monitoring and diagnostic strategies for factories, the configuration of control systems for automated processing equipment, and the planning of flexible assembly installations for a wide range of mass produced items. To

reach the target of control system configuration, that is, the control system layout, many individual steps are necessary. Knowledge of the development of a hierarchical control system will be necessary, as well as the analysis of needs for information and the description of production units. This leads to the specifications for control systems. Finally, the knowledge of the configuration of the individual production components, together with the specifications, leads to the design of the control system. This structure is just as interesting for the planning of flexible manufacturing systems: Together, the description of assembly functions, the knowledge of structures suitable for assembly, and an analysis of the product yield an assembly plan. Then, this plan and the assembly resources, together with the knowledge of planning of assembly installations, form the basis of planning the required plant.

The purpose of the work carried out in Karlsruhe is to discover a framework system which will be filled in, according to the function to be accomplished, either with control technology knowledge or with assembly technology knowledge, in order to be able to work out the configuration of control systems and/or the planning of assembly plants.

The second large and very ambitious project within the "expert systems" theme is being dealt with at the Fraunhofer Institute for Information and Data Processing in Karlsruhe (Dr Stensloff): the implementation of expert systems in automation systems. Its primary objective is the development of diagnostic and control systems for large automated installations such as refineries or sewage treatment plants. The term, diagnostic systems, is used because they try to determine automatically "where something is wrong;" while control systems optimize all necessary criteria. The importance of this is that the expert system reacts in real time, "in due time," and not half an hour after a breakdown.

In the current expert systems, the rules are entered in the form of known concepts; these rules actually have a rather empirical nature. They only express "superficial knowledge" because they cannot characterize the basic system through its causal connections in order to finally derive the rules from the system. The intention now is to follow a completely different approach, physically describing a sophisticated installation and as a refinery through its components. On the basis of this system description compiled the components, the so-called "deep knowledge," attempts are being made to obtain an expert system that generates its own conclusions, which give at least qualitative information, for example: "when the temperature increases in one place, a reaction must take place elsewhere."

In the foreground of this activity, we find model description, from which qualitative knowledge may be obtained, together with the problems of the so-called knowledge representation, description, and acquisition. The latter is a very important problem of knowledge processing in the field of expert systems. Professor Deussen: "Knowledge must be extracted from people. This is a very trying job because the human being who must load the expert system with knowledge concepts is a systems expert whereas the person he is dealing with has only knowledge expertise and not systems expertise. The two people must meet and initially be at odds with each other, before understanding each

other. This is often very difficult and leads in most cases to both having second thoughts. Therefore, knowledge acquisition is a thoroughly critical problem; this is particularly true for large expert systems. In this case problems may arise which are exactly the same as those that have already been encountered in traditional computer science and are known as "software crises."

Natural Language Systems

This project area is being dealt with in Saarbruecken by Professor Wahlster. It involves equipping an expert system with a natural language interface. The starting point is the fundamental knowledge already acquired by Professor Wahlster: If we want to analyze a natural language text and have it "understood" by a computer, then we must drastically restrict the area of knowledge treated. Only then is it possible to analyze the language, to make remote references to what has already been said, and to clarify ambiguous language constructions unequivocally. With these discoveries Professor Wahlster, during earlier activity in Hamburg, developed a system that can imitate a hotel manager and carry out a dialogue with a hotel guest concerning a limited area of knowledge, in this case, room reservations. Such a system makes it possible to carry on quite normal dialogues, in which it can even assume the active role. Based on these experiences, Professor Wahlster is now trying to make the expert system "speak." The knowledge base resident in the expert system should operate in two different ways: as a base for the information and as an auxiliary device for the analysis of the natural language.

Another project is the coupling of systems that understand images with those that understand language. This is being dealt with by Professor Nagel of the Fraunhofer Institute in Karlsruhe. He is interested in the modification of a scene over time. From a technical point of view, the problem is formulated as follows: An image sensor supplies, according to its resolution, 256 x 256 or 1,000 x 1,000 pixels in appropriate shades of grey 25 times in a second. It then is a question of extracting the essential information from the enormous quantity of redundant, trivial, and partially unnecessary information. For that purpose, many extremely different methods for image processing are already available. The time dimension also needs to be added to image sequence. Altogether this leads to enormous quantities of data. Reducing these is a prerequisite for the meaningful application of image-understanding systems. Surveillance systems are an example: A normal street scene with houses and trees, all of them virtually invariable objects. A car enters the scene. For the computer representation of the car in light of what has just been said, a considerable calculation effort is necessary just to ascertain that the car is coming around the corner. If we add another system to the present one, which expresses its knowledge of the basic scene as, "A grey car is turning right at the corner," then this is a concise formulation of the same circumstances but obtained with only a few bits. Thus, the purpose is to obtain natural language reports on moving objects through the analysis of image sequences. It must then be considered how the motion will be formulated linguistically, taking into account, among other things, the past (this was already mentioned) together with technical and location--related terms (there, here, over there, behind, in front of, between, parallel to, and so on). What makes the animated scene characteristic must also be represented in the form of language. In surveillance systems, a computer could then state, in precise defined sentences, what the connected sensors are seeing.

Mobile, Autonomous Two-Armed Robot

A third task, closely connected with the two aforementioned projects, is being dealt with by Professor Rembold in Karlsruhe: the construction of a mobile, autonomous two-armed robot. The design is a self-propelled carriage with two arms mounted on it. First, this carriage must be able to move on a plane, e.g., a floor, without, of course, colliding with anything. For that purpose, the robot must know its environment, that is, a model of the environment in which it is moving must be stored in its memory. It must read this environment with its sensors which must quickly inform the robot of its exact position in its memorized environment model. To some extent, it must also take into consideration the dynamic aspect of its environment: For example, components of that might be doors that open automatically, or a second, oncoming robot. In this connection, the sensors play a special role along with what we call "hierarchical evaluation" of sensor data. The human being knows this very well: A region through which he is passing is perceived only roughly at first; not until something which interests him comes into view does he look more carefully.

When the robot has found its way to its working place, it must "dock" there, that is, it must establish its connection with the bench and perform the tasks assigned to it. For this it receives work objectives only; it must decide for itself how to perform assembly processes, which means that it must perform assembly planning with the assistance of sensors. In this process, the coordination of its arms, which must interact but not collide, is a very special and by no means trivial problem.

LISP and PROLOG

LISP and PROLOG are typical programming languages for artificial intelligence. However, they are still simply too elementary for many applications, and the problem is to develop aids and tools to make them more user-friendly. Among other things, a "marriage" of the two languages is necessary. Each has its advantages and disadvantages, for which a balance must be found. The knowledge of many expert systems is formatted as "if-then" rules, which are resident in the computer in LISP, for example. It is not necessarily comprehensible to the end-user. The goal is to input rules in natural language and to have them translated by the system itself into its internal language. In addition, aids must be developed to construct efficient justification mechanisms, the aforementioned explanatory components.

Another subject treated in Professor Deussen's project is the further development of the PROLOG programming language. In PROLOG, a task is formulated as "if-then" rules. The computer or, as the case may be, the PROLOG system, then seeks all solutions that meet the given rules, but these rules yield an enormous number of solutions. The problem is how to work through this profusion of possibilities in order to reach the objective. To increase the efficiency of the PROLOG system, certain dynamic concepts have been introduced which influence the search strategy, but they are extremely complex and vague. These are not safe tools for a person who is not a master of this system. Professor Duessen: "The more complicated such a description is,

the more supports are needed so that the user obtains a reliable result." And that is his goal. The system must also become more efficient with respect to its processing time; the user should not have to wait too long for the results. Indications of where and how efficiency can be increased come from research and experience. A basic tenet of Professor Deussen and his colleagues is to be very clear about what kind of a language will actually be used for "logic programming" before constructing a PROLOG machine. Only then will it be possible to start integrating this into hardware and to construct the machine. Professor Deussen: "This is because PROLOG is already present in the microprogram, in the chip."

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WEST EUROPE/COMPUTERS

SWISS COMPANY DEVELOPS CAE/CAD SYSTEM FOR ASIC'S

Duesseldorf VDI NACHRICHTEN in German No 35, 29 Aug 86 p 17

[Article by Herbert Haug: "Computer Program Optimizes Chip Structure"]

[Excerpts] What could be better suited to calculate the optimized structure of a chip than a suitably programmed computer, especially since trained integrated circuit (IC) designers are expensive specialists in great demand?

The design system of the Swiss company, Lasarray, is such a software program for the development of customized integrated circuits, ASIC's (Application Specific Integrated Circuits). It reportedly enables electronics engineers, after a certain familiarization period, to develop--in anywhere from a few days up to several weeks, depending on their complexity and gate density--IC's according to their own circuit diagrams.

ASIC's, like IC's, are usually made of silicon layers, the wafers. In the simpler ones, all active elements are pre-positioned on the wafer but not yet wired. In other words, all the transistors are built in and only the customized wiring is done on the upper metal layer. This prestructuring permits cost effective mass production of the wafers without limiting their individual application.

The Lasarry design system is a CAE/CAD system which accurately produces this wiring design using a silicon compiler.

The design system software contains several different programs for the individual steps in the design process, for circuit analysis, logic and chronological simulation, automatic positioning and wiring, as well as for the generation of control data for manufacturing processes and test programs.

Even for this computer aided chip design the starting point is the circuit description. Circuit diagrams usually exist in every electronics department, mainly complemented by pulse diagrams or special information regarding the expected timing behavior. With adequate hardware, graphic computer reading of the circuit diagram is also possible.

To enable the silicon compiler to process these data, the circuit diagram must be transformed into a program. This takes place in Model (microelectronic design language), a descriptive language similar to Pascal.

All standard components such as NAND or NOR gates are listed in libraries. In addition macro cells, like flip-flops, counters, and adders, which have to be placed on the chip again and again, are stored electronically in a component library and can be called up and inserted into the design process.

After the circuit diagram has been read, the whole process is completely automatic. However, the user can intervene at any time to make desired changes. However, in most applications the individual components are positioned automatically on the chip and then wired.

All this happens like a tactical electronic game the silicon compiler plays with the computer. When the design process is complete, the silicon compiler calculates which silicon base the circuit can best be placed on, since the pre-manufactured standard wafers are available in various degrees of gate complexity.

The circuit components are now positioned on the selected master chip and then wired (still as an electronic simulation in the computer) in the final, optimized geometric arrangement. The selection criterion is the minimal use of interconnecting channels.

Only now is the design process complete. The silicon compiler produces the data tape which is used for the control of the actual manufacturing process. It is used directly and without deviations for the positioning of the direct laser exposure unit which now produces the individual wiring in the uppermost layer of the chip.

Such customized IC's can replace a complete printed circuit board in certain cases. Lasarray claims that by combining a design system with the laser exposure unit, even small series can be produced very quickly.

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WEST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

FRG'S RIESENHUBER ON STATE VS. PRIVATE INDUSTRY R&D FUNDING

Bonn DAS PARLAMENT in German 16-23 Aug 86 p 3

[Article by FRG Minister of Research and Technology Heinz Riesenhuber: "Thoughts on a Sensible Division of Labor"]

[Text] German science and industry, together with their fellow member states of the European EC, are well-equipped to withstand on their own the technological challenge of the present and of the 1990's. The extent to which the state and the EC should provide assistance to companies in this regard is the subject of various forms of discussion on the national and EC level.

Research and development, as well as the transformation of findings gained from it into marketable products and procedural innovations, are in principle the responsibility of the companies. However, the state can support this entrepreneurial activity by providing appropriate guideline provisions. These provisions include a research infrastructure that favors top scientific performance in basic research and in applied research, as well as a good national and EC-wide information and communication structure. Also of importance is an innovation-oriented attitude by the public procurement agencies. In many cases, however, market forces are insufficient to induce adequate research, development and innovation efforts by the companies. High risks with significant financial expenditure and a long turn-around period result in a situation in which state action is sensible. State support of research is also necessary in order to push companies towards the needed technological developments in areas in which the state is involved in providing for living conditions and for the future, such as in environmental protection, in health care, in questions of the industrial safety of technology and in the creation of humane working conditions.

German industry sees further justification for state research assistance in the costly research and technology development programs in the United States and Japan, which are harming the ability of European industry to compete on the international market for high technology goods. In the United States, companies also profit from government contracts and allocations in defense research. These military technologies with possibilities for civilian applications represent a potentially burdensome obstacle to international technology transfer.

Finally, state research assistance can be necessary in key areas of technology that without impetus from the state would not be developed quickly and comprehensively enough. This is true, for example, of information technology, biotechnology and modern materials.

In some of the EC partner states where the percentage of state-controlled companies is higher, where the markets are under stronger administrative influence and where there are larger deficits in the companies' productive capacity and competitiveness, considerable state support of research in industry is often an end in itself. It is basically justified by the significance of these industries for economic and social development and by the higher level of development of the partner countries. The EC Commission sees real justification for support of research in the economy in the often considerable risks and in financial expenditures that exceed the productive capacity of the companies. For this reason, it requires that state assistance measures offer incentives and compensate for specific risks and costs. At the same time, it warns against supporting activities closely associated with the current production and marketing situation, which also applies to the EC's own research assistance.

In March 1986, the Commission submitted to the Council guidelines for a new EC outline program for research and technological development for 1987-1991, which involves EC expenditures of 10.3 to 12.2 billion ECU. The various appropriations from the member states for state research assistance in the economy amount to a considerable increase in EC funding for support of the project, although the range of the EC instruments for research policy has become broader and the policy of perfecting the domestic market through legislative and legal measures is making progress. It is for this reason that the question of a clear division of responsibilities between the member states and the EC arises with particular urgency.

What form should this division of responsibilities take, and what criteria should it follow? Should it emerge from obvious, directly applicable principles, or can it be stipulated pragmatically for the foreseeable future? As long as the assistance programs adopted by the EC included only certain areas, the need for a precise division of responsibilities was less pronounced. It was not until the beginning of the 1980s, when the EC programs for research and development were enthusiastically expanded to more and more areas, that the need of the member states for a clear division of responsibilities was articulated. The selection criteria adopted by the Council in 1983 basically correspond to the effort by the member states to assign specific EC duties to the EC without changing their own assistance policy.

According to these criteria, the EC should only take action if the task inherently can only be carried out by the EC. This is the case:

--in solving international environmental and climate problems,

--if a significant contribution to perfecting the domestic market can be expected from international joint arrangements, such as in the area of norms and standards,

--in steps towards the creation of a European research infrastructure and in steps towards improving scientific and technological productive efficiency through support for mobility and exchanges of scientists, cooperative ties between research institutions and for the cohesion of the EC in scientific and technological terms.

In addition, the EC should generally take action if the task can be better approached by the EC in terms of scope and expenditure, or if it can be handled more efficiently or economically or with technological and scientific advantages on the EC level.

These criteria for distinguishing between national research support and EC activities have thus far proven to be useful only in the sense of describing the evolved situation, but have yet to provide a basis for actual decisions in specifying programs. Thus, only a few programs today--the programs for environmental and climate research, ESPRIT, the program for nuclear fusion, radiation protection, radioactive fallout and the stimulation of cooperative ties and exchange in the scientific and technological domain--meet these criteria.

With its new outline program for 1987 through 1991, the Commission is now recommending a reassessment and continuation of the selection criteria. It is of great importance that the results of the effective analysis be included in the continuation of the selection criteria.

If a revision of the criteria turns out to be unavoidable, then it must be agreed that the key criterion of EC added value, which has become the most discussed point in this realm, can only be meaningfully applied if it is linked to jointly determined goals of EC research policy. The following goals are indisputable:

--A strengthening of the productive efficiency and competitiveness of European industry;

--Perfection of the domestic market for high technology goods;

--The creation of a European research area with largely uniform marginal conditions for research, in which mobility and exchange of scientists, international cooperation between companies and research institutes and in general the physical cohesion of the EC in science and technology are a reality.

On the other hand, the goal of the economic and social cohesion of the EC is controversial. The difficulty here is that the EC has a separate policy of strengthening economic and social cohesion using specific instruments (structural funds, integrated Mediterranean Sea programs, etc.); the research

programs of the EC are not part of these instruments. Naturally, all companies engaged in research, including the small and medium-sized companies, in all the member states must have the same opportunities for access to funding for research assistance. However, the criteria of research policy must in principle play a predominant role in the funding of research programs and in the selection of research projects.

Only after the joint goals of EC research policy have been established is it meaningful to ask whether EC implementation of the research projects in question is more promising than implementation on the national level, or if it shows an added value for the EC. If the Council adopts the new formulation with the selection criteria of the scope of the task and the EC added value, then a selection must be made according to the effective guidelines proposed by the Commission.

According to Article 130 g of the EC Treaty, the measures of the EC, in particular the research programs, should supplement the activities in the member states (complementary principle). Supplementing could mean that the EC does work on areas of research support that are already covered by a majority of member states. The extent to which this is applicable in individual cases can clearly be described only momentarily, in view of the rapidly changing nature of the European research landscape. The question, however, concerns what orientations both the EC bodies and the member states should deduce from this position with respect to their own future behavior. Attempts that have been made thus far to stipulate and pursue these orientations in the form of selection criteria would be continued.

An alternative formulation could emerge from the willingness of EC bodies to use milestones in middle-range planning to check the activities of member states with respect to whether supplementary measures by the EC are called for. In this sense, it is first of all conceivable that the member states could cut back or not even initiate support in the areas covered by the EC. It cannot be the responsibility of the EC to be active in areas where the member states refuse to be sufficiently active, even though they could. The complementary principle means that the member states should first make appropriate individual efforts. Only if they lack the necessary strength can benefits be drawn from EC programs.

However, it is also conceivable that member states develop solutions to the restructuring of their support areas, the focal points of support and their plans for support through broad-based systems of research assistance in conjunction with the Commission and the Parliament on a pragmatic, case-by-case basis. This not only in the sense of an increase of the synergy effect, but also in the sense of a conscious restriction and occasional abandonment of assistance activities on behalf of EC programs and plans. This process requires of the member states a dialogue with national industry and science, of the EC a basic consensus on the rules of policy that are to be adhered to in the EC's research assistance.

The coincidence of the planning work on 100 and more EUREKA projects and the preparation phase of the second outline program of the EC is cause enough for the state agencies and the bodies of the European EC to similarly give some

thought to principles of the division of responsibilities. There is unity concerning the goal of avoiding duplication and in all cases achieving an integral strengthening of effectiveness, in the interest of an efficient use of scarce resources.

EC programs, which essentially penetrate the foundations of research activities, are drawn up in a broad process of consensus, in which the goals and priorities of the many participants are established and in which the quite divergent interests of the member states leave their mark in the form of additions. In contrast, EUREKA programs are defined according to precise, innovation-oriented goals and emerge with few participants who are for the most part similar in effectiveness and interests, thus requiring a shorter decision-making process. This is moreover often done without public funding.

Both ways, the broad-based as well as the very targeted approach, are indispensible for guaranteeing and strengthening the competitiveness of European industry. The Commission itself referred to this in its guideline document for a new outline program. In this way, the preconditions for harmonious coexistence and interdependence are created, through which the EUREKA program "is based on or supplements" the EC programs and the projects undertaken within its framework, as the Hanover EUREKA declaration of principles formulates.

The EC should see to it that large European joint ventures of strategic, commercially relevant character that exceed the power of even the larger member states not be necessarily channelled to EUREKA. The EC should work towards taking up, within its financial framework, an appropriate number of strategic and innovation-oriented projects of a European cut.

For EC cooperation in EUREKA programs for which assistance with public funding is necessary, more detailed criteria are found in both the EUREKA declaration of principles and in the guideline document for the new outline program. The Commission foresees appropriations for financial participation by the EC in its research programs:

--if the EUREKA program is "of EC interest";

--if the EUREKA program joins projects supported by the EC.

Hopefully, the EC will be able to provide its own revenues in all cases in which these preconditions are in evidence.

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WEST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

STANDARDS, FEWER TRADE BARRIERS SEEN AS KEY TO EUROPEAN MARKETS

Bonn DAS PARLAMENT in German 16-23 Aug 86 p 6

[Article by Otto Wolff von Amerongen, president of the FRG Chamber of Industry and Trade: "The Home Market as a Basis Is Still Missing"; first paragraph is DAS PARLAMENT introduction]

[Text] In recent years, one has heard again and again that Europe's technological competitiveness is endangered. Accordingly, Europe is not up to the competition in technology and innovation in international markets and, in this connection, there are often loud cries for the state. It seems to me, however, that a possible threat to European competitiveness in the technological area lies less in Europe's being insufficiently dynamic technologically but rather could perhaps emanate from the general conditions of the economic and political environment: if more inflation policy than stability policy and more distribution policy than growth policy is pursued, then capital resources go less into innovations but into state consumption and the social distribution of income. This has been Europe's weakness for years.

It is undisputed that constant innovation of products and processes will always be a driving force behind competitive strength. Nevertheless, Europe's supposed technological weaknesses cannot be measured by the share of the market for microchips, which, as you know, is 90 percent in the hands of Japan and the United States. If, one the other hand, we view the area of industrial goods without differentiating too closely technically, then the share of the world market of just three European countries (France, Great Britain and the FRG) is around 35 percent, that is, ahead of the United States with 30 percent and Japan with 16 percent. Despite a number of handicaps, The European economy continues to hold top positions in the automobile industry, machine building, power station construction, and the chemicals industry, for example. And as for high-tech fields, European industry seems to be better than its reputation. So there quite a number of industrial sectors that have distinguished themselves, especially in the area of the integration of mechanical engineering and electronics.

European industry now has more confidence in its own technological potential. This is becoming more and more obvious of late. Success comes particularly when it is a matter of capital goods with the specialty of "tailor-made industrial suits." In this connection, it is especially interesting that many

small and medium-sized enterprises are thereby applying remarkably high technology. This shows that innovation potential is often better exploited in small decentralized units, an observation that was also made in the United States and that is slowly being realized in Japan as well.

Without playing down the difficulties and problems of the still-imperfect European market, today it can nevertheless be stated that the lamentations about a "Eurosclerosis," the calcification of the old continent, have been silenced. Closer and closer cooperation is being practiced between suppliers and consumers precisely in the area of high-tech products, for only in this way can up-to-date technologies be used sensibly.

Whoever wants to participate in the world market requires a large home market as the initial basis. Only Europe as a whole can offer this market. In the area of research and development, a combining of forces is necessary to remain competitive. Europe must see to it that it does not waste its research and development resources through costly redundancy. For there are many technologies that can be realized and applied only in minimum magnitudes and that do indeed presuppose not only national but often international cooperation as well.

But I again stress the application of this transnational cooperation for certain fields. Where it is a matter of consumer goods for specific markets, the competition must ensure that efficiency and productivity are "kept alive" through the parellel efforts of enterprises. For otherwise the avoidance of "parallel efforts" in the enterprises through "cooperation" could lead to the formation of cartels and the eroding of competition.

So Far Many Hopes Have Remained Unfulfilled

In principle, it is undisputed that technical progress, in research as well as applications, must take place primarily in the individual enterprises. Large-scale projects and research cooperation with state support can play only a complementary role in a market economy.

What contribution can joint reserach programs of the EEC make to this combining of forces? Besides basic research, where numerous fields are opening up for joint efforts, there are large-scale projects that make a public participation seem reasonable. They are technologies that serve in life support, such technologies as, for example, environmental protection systems and energy or information technologies that can be developed or applied only jointly, that is, that require international cooperation. Thus, for example, the EEC initiative to organize a strategic research program for information technologies (ESPRIT) is very well suited to provide the necessary dynamics for efforts by the private economy in the various member countries. An indispensable precondition for such EEC initiatives, however, is that they not be burdened with protectionistic and administrative obstacles with the ultimate result that they hinder more than promote the desired cooperation. "Ariane" is likewise a catchword for successful European cooperation in space operations.

But from the viewpoint of the many European enterprises that are in competition with each other and worldwide, it is also necessary to solve many problems. Many hopes and expectations for a truly common market have not yet been fulfilled. The economy is missing a satisfactory permeability of the borders for persons and goods, a complete liberalization of the movement of goods, capital and services, and not least a leveling out and overcoming of the substantial differences in the tax systems of the member countries.

In the area of technology in particular, the adverse effects on the international competitiveness of the European economy can be attributed to the fact that there is no European "home market" on a par with the American and Pacific markets. Thus European firms must compensate for the disadvantages such as the multiplication of development and marketing costs that characterize the submarkets of individual countries.

The elimination of internal European barriers through the further reduction of technical impediments to trade or through the harmonizing of industrial standards could make a quite substantial contribution not only to the intensification of the research cooperation of European firms but also to the improvement of the industrial capacity of Europe as a whole through the expansion of market opportunities.

The willingness expressed in the white paper, "On the Improvement of the Internal EEC Market," to develop further the internal European market through the continued pragmatic reduction of obstacles and prohibitions so as to equalize the large differences that still exist between the EEC member nations appears realistic and practical. Precisely because a policy exclusively aimed at achieving harmony has heretofore served more to hinder than to promote integration, this pragmatic way seems to be more promising for the achievement of integration through the mutual recognition of regulations and their equalization. This does not exclude harmonization where it is possible and reasonable. But the lack of European standards should not be used as an excuse to hinder free commerce.

Fear of State Influence

There are hardly any restrictive regulations in the individual member states against joint research efforts. But European partnership in the area of technology means more than pure research cooperation. The barriers are still great when it comes to taking the natural next step, that is, to making joint economic use of the results of research and development in marketable products and methods. This last decisive step in a process of innovation is often made possible only through close forms of cooperation. In the area of corporate law, there are also a number of commission proposals that can facilitate the international cooperation and integration of enterprises. This holds true, on the one hand, for the already-passed "European Economic Community of Interests," which provides relief for legally independent branch establishments in other member states and, on the other hand, for the regulation of takeover bids. In this connection, it is also apparent that in important areas of corporate law codetermination represents a critical obstacle to harmonization and that the commission can probably make progress only by setting aside this problem.

An additional obstacle to the multinational cooperation of firms is often the fear of state influence--state control of the movement of capital, for example. But an unrestricted movement of capital is indispensable for the operability of an internal European market. As seen by the economy, the demands of the EEC Commission for the liberalization of the movement of capital are lagging behind its otherwise ambitious goals . On the way to an improved internal European market, however, high priority ought to be given to this objective and in particular all foreign exchange controls should fall by 1992.

Top-level and key technologies are for the world market and cannot be stopped at national or continental boundaries. It is also the mission of the Rome agreements to pursue a liberal world trade policy and to establish open and pervious borders internally as well as with respect to third countries. A mobilization of the European technological potential must heed this mission and therefore must not stand in the way of an intensification of technological cooperation with third countries. And a perfected internal European market must be integrated into the international division of labor if it is to remain effective and dynamic. All ideas that sought to achieve an increase in European economic power through isolation (even just temporary or partial) from the world market are wrong from the start. The European economy will be able to make a lasting improvement in its competitiveness only when it continuously faces international competition. The Europeans--in contrast to other participants in the world market!--should make the internal European market accessible to all enterprises outside the EEC, especially in the technology sector. A European econmic policy aimed at integration must not lose sight of the competitiveness of European enterprises in the world markets even if the focus of its efforts is the techological cooperation of the member countries.

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WEST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

EC SELECTS PROJECTS, PREPARES PHASE II OF ESPRIT

Project Review Process

Bonn DAS PARLAMENT in German 16-23 Aug 86 pp 11-12

[Article by Horst Huenke, department head in the Central Office for Telecommunications, Information Industries and Innovation of the EC Commission in Brussels: "The Key Position of Information Technology--The ESPRIT Program"]

[Excerpts] Information technology (IT) is one of the most rapidly developing industrial fields in the Western world. In 1985, sales of IT products on the OECD markets amounted to approximately 440 billion ECU. Annual growth rates are around 15 to 25 percent. The contribution of information technology to the GNP is around 8 percent, and for approximately one-third of the GNP, information technology is of key importance, having a crucial influence on the competitiveness of industry and of the service sector. Although the European market represents a significant part of world demand, European industry is in a weak position in a number of sectors. It can be expected that at the beginning of the 1990's, Europe will be the largest single market for IT products and services, and that European suppliers will, if the present trend continues, have a slowly decreasing share of this market. Compared to Japan and the United States, information technology in the Community has for a long time not been as strong a locomotive for economic growth or contributed to the creation of new jobs. This key role of information technology for the economic life of the Community is the reason that IT was chosen as one of the first areas for joint efforts in the new technologies.

Pilot Phase Began in 1983

The European Strategy Program for Research and Development in Information Technology (ESPRIT) thus has the following goals:

--the stimulation of industrial cooperation in pre-competitive research and development;

--contributing to the creation of the basic technologies required for competition on the world market in the 1990s;

--smoothing the road towards internationally recognized norms.

The ESPRIT program was created in a joint planning process between the information technology industry and the Commission. Approximately 100 experts from 12 large information technology companies from Germany, England, France, Italy and the Netherlands were initially involved in planning its technical elements. A first draft of the technological plan for ESPRIT was submitted in mid-1982, after which it was discussed and continued with representative groups of experts from industry, software houses and users, as well as from universities.

In the fall of 1982, the Commission proposed a pilot phase for ESPRIT. This pilot phase was intended to show whether industrial willingness to enter into international cooperative ties was sufficiently in evidence, and whether the program could be run efficiently on the Community level.

Interest in the first invitation for project proposals was overwhelming; the procedures developed for selecting projects and distributing funding proved to be satisfactory. The proposal for the ESPRIT program submitted by the Commission in the summer of 1983 was based on the experiences gained in this way; industry and science drew up a detailed work schedule, initially good for 5 years, that outlines projects and topics in the five areas of ESPRIT:

Microelectronics
Software technology
Advanced information processing
Office systems
Computer-integrated manufacturing

In keeping with the industrial character of the program, two firms established in different member states must participate in each project. In order to assure the strategic effect of the program and to avoid fragmentation, three-fourths of the work is to be done in large projects of at least 100 worker-years.

Planning of the technical contents of the program is continued on a yearly basis in cooperation with industry and science. This continuation of the work schedule is the beginning of the annual operational cycle of the ESPRIT program; the revised work schedule serves as the basis for a public invitation for proposals. The proposals submitted are evaluated by teams of independent industrial and scientific experts; the Commission makes its selections on the basis of this evaluation. The selected projects generally receive a subsidy of 50 percent of the costs of the research and development plan; a total of 750 MECU (million ECU, 1 ECU = DM 2.14) is alloted to ESPRIT for a 5 year period in the budget of the Community. At 24 percent, microelectronics has the biggest share of this; 23 percent is for advanced information processing, 22 percent for office systems, 18 percent for software technology and 13 percent for computer-integrated manufacturing.

Within the Commission, the Main Office for Telecommunications, Information Industries and Innovation is responsible for running the program. In addition, and in particular with respect to the selection of projects, the Commission is advised by an ESPRIT administrative committee. The members of this committee are responsible for the programs in their respective member states. The duties of the committee also include the coordination of the various programs.

Every 6 to 12 months, the current projects are discussed in terms of their progress and results in so-called "reviews." The procedure for this was borrowed from the standard industrial practice. Here as well, the Commission makes use of the cooperation of experts from science and the economy.

Overwhelming Response

Since the pilot phase of ESPRIT, more than 1,000 proposals have been submitted in response to the invitations. The amount of available, budgeted funding has meant that about 250 of these projects have been accepted. At present, work is being done on 200 different projects, and by the end of this year approximately 2,000 researchers and developers will be active in the program. Work on the projects is carried out in the laboratories of the participating organizations.

The number and quality of the proposals submitted verify industry's overwhelming interest in ESPRIT. Most elements of the work schedule were covered much more quickly than had been predicted. Firms of all sizes, universities and independent research institutes are participating in the program. Small companies with less than 500 employees are participating in more than half of the projects. Universities or research institutes are taking part in 80 percent of the projects.

Further evidence for the success of the program has been provided by an evaluation conducted by an independent committee of industrial experts. The evaluation committee looked into the opinions of persons and organizations participating in the implementation of the program. The expectations of the participants concerning the usefulness of cooperation were surpassed; they were unanimously of the opinion that ESPRIT has contributed to the promotion of trans-European cooperation between large and small organizations, as well as between industry, colleges and research institutions. There are clear signs that more extensive cooperation outside ESPRIT is emerging as a result of the ties within the program. Furthermore, the participants agree that ESPRIT is helping industry, colleges and research institutes to create a technological foundation for a European IT industry.

ESPRIT has triggered a dialogue between companies and an exchange of know-how and ideas on all levels. Of particular importance is the fact that this dialogue is being conducted on an administrative and managerial level as well as on a technological and scientific level. This leads to increasing coherence within the IT industry, which was previously lacking. The cooperation in no sense interferes with the ability of commercial companies to compete with one another on the market.

In the meantime, the Commission has initiated the planning work on the second phase of ESPRIT. The suggestions of the evaluation committee concerning a stronger thematic focus are being incorporated into this. As was the case while the first phase of ESPRIT was being defined, this planning work is being conducted together with industry and science. The industrial concerns involved and interested in ESPRIT have suggested--and have thus made a corresponding commitment--that the personnel deployment for cooperative research and development activities be increased to at least 30,000 worker-years. The first phase stipulated 10,000 worker-years.

The following goals have thus far emerged from the planning stage:

--The achievement of as good a technological position as possible in the strategic area of microelectronics, as well as of a stabile competitive position in certain selected areas;

--The preparation of advanced methods and tools in order to increase productivity in designing information technology systems;

--The development of IT application technologies, with a special emphasis on production automation.

The second phase of ESPRIT also provides for basic work in selected IT areas of strategic interest. Finally, it should include measures that promote the creative and important role of small and medium-sized companies. Furthermore, arrangements for the participation of organizations in EFTA countries are under consideration.

Phase II Recommendations, Phase I Statistics

Brussels ZWISCHENBEWERTUNG VON ESPRIT in German 15 Oct 85 pp 53-60

[Excerpts from report issued by independent panel of experts which evaluated the Esprit program through October 1985]

[Excerpts] 4. Recommendations

Based on the assessments described in the previous chapters, the ESPRIT evaluation committee makes the following recommendations:

4.1 ESPRIT II

As the main vehicle for the future development of ESPRIT, the focus of ESPRIT II should continue to be pre-competitive research.

The funding made available for ESPRIT II should guarantee that it will be possible to significantly increase research activities in the IT area.

Despite urgent requests to expand the areas being supported, the evaluation committee is of the opinion that a step in this direction could have a detrimental effect on current activities, which should thus continue to

concentrate on the areas of microelectronics, software, advanced information processing, office systems and computer-integrated manufacturing.

The research sectors receiving support should be combined into the areas of microelectronics, advanced information processing and applications.

Advanced information processing would mean a combination of present areas 2 and 3 (thus, software technology and advanced information processing).

The applications area would mean a combination of the present areas 4 and 5 (thus, office systems and computer-integrated manufacturing).

The proposal that some areas of consumer electronics be involved in the realm of ESPRIT should be reexamined.

Although it can be assumed that optical electronics is being supported within the framework of the RACE program, additional support within the framework of ESPRIT could prove to be necessary.

It is recommended that a certain amount of flexibility be permitted in classifying projects as type A and type B within the different areas.

These areas are distinguished by different characteristics, and thus by different A-B requirements.

4.2 Demonstration Projects

In view of the strength of the arguments for demonstration projects, the evaluation committee is in favor of the creation of a special program of ESPRIT demonstration programs in the area of information technology.

These demonstration projects would be carried out under the broad-scale participation of users and would be advanced enough to serve as a meaningful demonstration for the uses associated with the application of advanced IT systems and services.

It is planned that a series of demonstration projects be arranged that would serve as an impulse for users and for the market on behalf of IT products and services.

In view of the nature of demonstration projects, it is to be assumed that they will tend to be dominated by large companies.

In order to assure the participation of the KMB, it is suggested that they be accorded appropriate involvement in such projects.

A procedure for financing demonstration projects must be developed in agreement with suppliers and users.

4.3 Funding Needs and Allocation

It is suggested that funding provisions for ESPRIT be increased and that additional funds for the demonstration projects be made available.

Attention should be given to the fact that the various categories of participants could play their appropriate role.

--Pre-competitive research projects, oriented towards achieving strategic goals, and jointly conducted by industry, technical colleges and independent research institutes.

--Pre-competitive research projects, the project leaders of which are small and medium-sized companies.

--Pre-competitive speculative research projects, the project leaders of which are technical colleges.

--Application-oriented demonstration projects in which suppliers and users are involved.

It should be possible for the smaller organizations (KMB and research institutions) to participate significantly, around 10 percent, in the large demonstration projects.

4.4 Project Selection and Evaluation of the Proposals

Within the framework of ESPRIT II, it is recommended that greater attention be given to the strategic and commercial significance of the supported projects.

Strategic significance should include consideration of the market potential, the ability and the willingness of the companies to initiate commercial potential and the effects on the trade balance and employment.

It is furthermore recommended that the application evaluation process be reviewed with respect to the introduction of an alternative, multi-stage process, which should include project summaries and oral presentations.

In addition, consideration should be given to critical comments concerning the evaluators.

Where possible, inappropriate influence on the projects (such as attempts to combine projects) should be avoided.

Competition and overlap in the research projects should not be inherently bad.

It is better to make a choice than to combine two incompatible partners in one project.

During the evaluation phase, the applicants must be continually informed of the status of their proposals.

The evaluation criteria should have a more lucid form, and should guarantee quick feedback on the status of the projects.

4.5 Project Management

The evaluation committee is of the opinion that the management of trans-European projects with multiple partners demands special professional experience, and recommends that this question be given special attention.

It is preferable that managers be deployed as technocrats and that professional management technicians be used.

It is thus recommended that the KEG offer better guidelines for this duty, as well as corresponding support, in the form of training courses, for example.

For large projects, it is recommended that separate administrative managers and technical managers be appointed, whereby the project leaders in Brussels would bear the responsibility of contract managers.

The project leaders have in general requested greater responsibility than that which is currently accorded them.

4.6 Communication

An improvement in communication is imperative in all areas of ESPRIT.

An improved electronic communication system should be put into operation.

Communication and dialogue within the framework of the ESPRIT program should be improved through:

--a monthly information service,

--a participant and ITTTF register,

--more technology clubs and workshops.

It is recommended that the objectives and purposes of the Technical Week be revised.

The intensified use of technical workshops should promote more extensive technical dialogue.

The policy of the KEG in the sense of the release of technical information should be reviewed with respect to the industrial character of the program.

At present, there is a conflict between the needs of EC industry and the needs of technical colleges.

4.7 Project Continuity

In order to assure continuity of the research projects, it is emphatically recommended that short-term (thus provisional) agreements be avoided and that continuity be guaranteed.

Adjoining agreements should be granted long before the conclusion of the first phase of the project.

4.8 Centers of High-Level Research

Even if no new centers of high-level research should be established, it is recommended that steps be taken to promote the European dimension of the existing centers.

The preservation of ESPRIT grants is recommended.

The networking of first-class centers should be realized and further developed.

4.9 Technical Colleges

It is assumed that it is essential that the role of technical colleges, their participation in ESPRIT and the situation in terms of agreements and finances be reviewed.

It is recommended that negotiations between the KEG and representatives of the technical colleges participating in ESPRIT be conducted in order to clear up these problems.

--During the negotiations, the overall goal of ESPRIT--the promotion of the industrial competitiveness of the Community--should not be ignored.

4.10 ESPRIT Prizes

As incentive and in the sense of public work, it is recommended that ESPRIT prizes be awarded on a yearly basis for achievements in the areas of innovation, project progress, etc.

4.11 Prognosis

In conclusion, the evaluation committee emphatically recommends a continuation of ESPRIT and a consolidation of its previous successes.

ESPRIT should also continue to be regarded as an embodiment of cooperative, pre-competitive, trans-European high-technology research, which at the same time creates a foundation for the established, more strongly development-oriented projects in conjunction with RACE and EUREKA.

Based on its conclusions and recommendations, the evaluation committee makes reference to the following issues:

1. ESPRIT can be viewed as the necessary and indispensible instrument for the creation of a climate of cooperation between industry, technical colleges and research institutes.

--However, ESPRIT alone will not compensate for the lack of European competitiveness compared to the United States and Japan.

2. Despite their economic and strategic significance, telecommunications, consumer electronics and for the most part optoelectronics and peripheral equipment was excluded from ESPRIT.

--Furthermore, it is not clear that the preconditions for a rapid transition over to prototype development, manufacturing and marketing are being created.

3. A clustered concentration of research and development activity on the few strategically and economically important segments of the IT industry is necessary if ESPRIT is to realize its full potential. This should be taken into consideration in the working plan for the second phase of ESPRIT.

The issues above are so important that, in the opinion of the evaluation committee, the Commission should conduct a special study within the comparable framework of the industrial cooperation that made the start of ESPRIT possible in the first place.

In the current industrial situation, support for pre-competitive research should also continue to be the primary function of ESPRIT.

We believe that the ESPRIT program creates the foundation for the development and expansion of the European IT industry.

A good beginning has been made, but there remains much to be done.

The evaluation committee believes that future generations will view ESPRIT as a significant milestone in the creation of a joint field of participation--with far-reaching consequences for all branches of industry.

Appendix A: Statistics on ESPRIT (1)

A1 ESPRIT Pilot Phase (1983-84)

Area	MEL	ST	AIP	BS	CIM	Total	% of Total
Proposals received (no.)	9	27	37	39	33	145	
Proposals accepted (no.)	6	5	5	11	9	36	24.8
Funding provided (MECU)	1.91	1.93	1.76	3.18	2.72	11.5	
Funding provided (percentage)	16.6	16.8	15.2	27.7	23.6	100	
Number of partners	25	23	28	47	33	156	
Number of partners as percentage	16.0	14.7	17.9	30.1	21.1	100	

MEL--microelectronics
ST--software technology
AID--advanced information processing
BS--office systems
CIM--computer-integrated manufacturing

Notes:

1. Figures only for the first year, for continuation in subsequent years, see A2.

2. Large companies with more than 1,000 employees represent 72 percent of the industrial firms participating in the pilot phase.

3. The average number of participants per agreement is 4.3:
   --7 agreements had two participants
   --22 agreements had between three and five participants
   --7 agreements had more than five participants.

This data was made available by the Task Force for Information Technology and Telecommunications.

A2 First Year of ESPRIT (1984)

(Invitation for May 1984 Proposals; includes continuation of pilot projects)

Area	MEL	ST	AIP	BS	CIM	Total	% of Total
Proposals received (no.)	66	66	112	75	122	441	
Proposals accepted:							
--Continuation of pilot projects	4	1	4	10	4	23	
--New 1984 projects	25	15	19	13	15	87	
Total accepted	29	16	23	23	19	110	25
Anticipated financing in MECU (1)							
Pilot projects (cont.)							
--Type Alpha (2)	0	13.9	19.7	7.0	0	40.6	
--Type Beta (3)	9.65	0	2.5	18.9	6.8	37.9	
Total pilot projects						78.5	
New 1984 projects							
--Type Alpha (2)	63.3	40.7	55.8	52.4	21.2	233.4	
--Type Beta (3)	18.2	12.6	18.4	6.2	22.4	77.8	
Total new						311.2	
Total anticipated						389.7	
Number of partners	118	79	130	124	103	554	
Percentage of total	21.3	14.2	23.5	22.4	18.6	100	
Number of Type A proj.	12	10	11	10	12	55	
Number of Type B proj.	17	6	12	13	7	55	

Area	MEL	ST	AIP	BS	CIM	Total
Number of companies	77	51	68	80	50	326
Number of universities	18	13	39	18	19	107
Number of research institutes	21	12	21	23	18	95
Number of other institutes	2	3	2	3	16	26

Alpha-Beta ratio for new projects = 3

(1) Financing depends on the development of the projects. The numbers indicated correspond to the situation in November 1984. In September 1985, the anticipated total for 1984 proposals was reduced from 389.7 to 372.0 MECU, which could be attributed to changes in the projects.

(2) Alpha = more than 5 MECU/project

(3) Beta = less than 5 MECU/project.

A3 Second Year of ESPRIT (1985)

(Invitation for Proposals Made in May 1985)

Area	MEL	ST	AIP	BS	CIM	Total
Proposals received	67	71	94	81	76	389
Proposals under consideration (1)	24	16(2)	22	23	10	95
Anticipated financing (MECU) (1) for the proposals under consideration	76.5	37.7(2)	65	54.6	35.1	268.9
Number of agreements	120	77	133	138	97	565
In % of total number	21.2	13.6	23.5	24.4	17.24	100
Number of Type A proj.	9	1	11	7	3	31
Number of Type B proj.	15	15	11	16	7	64
Number of companies	71	45	70	82	48	316
Number of universities	21	24	30	27	19	121
Number of research institutes	20	3	17	19	11	70
Number of other institutes	8	5	16	10	19	58

Situation in September 1985

(1) The agreements are still in the negotiating stage. The figures reflect only provisional information.

(2) Due to the additional invitation for proposals in the area of software technology (closing date: 15 November 1985), new proposals are expected in 1985. Anticipated additional funding for ST: 18.9 MECU.

(3) Including Gamma projects, thus supplements to existing projects.

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EAST EUROPE/CHEMICALS-PHARMACEUTICALS

SPECIALIZATION WITHIN CEMA CHEMICAL PRODUCTION

Prague TECHNICKY TYDENIK in Czech No 33, 12 Aug 86 pp 1, 2

[Article: "The Guideline: Small-Scale Chemistry"]

[Text] The economic and R&D cooperation of CEMA countries is oriented to safeguarding the socialist countries strategic self-sufficiency in chemical products essential to successful intensification. Partial tasks of this process are a higher assessment of raw materials and energy, provision of scarce raw materials, establishment of waste-free and low-waste technologies, and increased division of labor in production and pre-production stages.

Development till now has led to an increased share of specialized production in chemical products trade between CEMA member countries on both a bilateral and multinational basis. In 1985 the supplies of specialized production were more than ten times higher than in 1975; their share of the total exchange in the branch increased threefold, i.e. 40 percent. Collaboration has developed on the basis of long-term agreements on specialization and cooperation. Bilateral contracts were made in petrochemicals, pharmaceuticals and power-intensive products (CSSR and USSR); formic acid, olefins, refined chemicals, (CSSR and GDR); organic dyes, carbon disulphide (CCSR and PPR); pharmaceuticals (HPR). Multilateral agreements were made for the production of radioisotopes, organic dyes, complementary preparations for textiles, pharmaceutical preparations, immuno-biological preparations, catalysts and synthetic rubber.

Czechoslovak export items include organic dyes, complementary textile preparations, clean chemicals, polymer ingredients, slabs, petrochemical products, products for plant protection, synthetic fibers, paint materials, tire, conveyor belts and rubber products. The most important import items are phosphorus and phosphoric raw materials, methanol and synthetic rubber, ammonia, synthetic fertilizers, petrochemical products, synthetic alcohol, and others. Within the international division of labor, the structural profile of the Czechoslovak chemical production is geared to small-scale chemistry, which markedly reduces the chemical industry's material and energy intensiveness. Furthermore, its products have a strategic importance for the development of the socialist countries national economies. Their sales are for the most part assured even in the long-term perspective. Demand in the socialist countries generally exceeds production capacities so that they belong among the

so-called hard assets in the trade balance. The specifics of the development of small-scale chemistry are its requirements on the R&D base, a highly developed management mechanism capable of fast and effective adaptation, and production innovations that greatly exceed the average number of innovations in the branches of basic chemistry. There is hardly any doubt that it will not be easy for the Czechoslovak chemical industry to meet such high requirements. However, it is useful to realize that these demanding qualities will guarantee future good sales in developed markets during the last ten years of this century. Basic chemical products already are or will soon be produced in several developing countries with very cheap labor. Producers from developing countries will therefore offer such products at prices we are either unable or unwilling to match.

The socialist countries' activities are coordinated by the CEMA standing Commission for Chemical Industry Cooperation and the international organizations Interchim, Intervolokno and Interneftprodukt. Interchim directs production and R&D cooperation in the production of organic dyes, plants protection products, polymer ingredients and refined chemials. Intervolokno and Interneftprodukt are oriented to cooperation in the relevant branches.

Also in the domain of R&D cooperation, the Czechoslovak organizations' most important partner is the Soviet Union and its respective production and R&D associations, enterprises and organizations. In the past year alone 26 Czechoslovak and 21 Soviet organizations participated in R&D; they jointly solved problems related to production application of new technological processes in the production of polymer ingredients, organic dyes and pigments, chemical fibers, refined chemicals and biochemical preparations, monocrystals, fiberglass fibers and fabrics, organosiliceous compounds, slabs, plant protection preparations, paint materials, household chemical preparation and many others.

A specific example of effective cooperation is the plant for household chemical products in Uzhorad which manufactures many products developed in the CSSR, such as Lac-clean and Cleaner-polish (for automobiles), enamel cleansers, Vanavan and others, for the Czechoslovak and Soviet markets. There is an equally intensive exchange of technological knowhow between Slovnaft Bratislava and the Krementschug oil processing plant in Jaroslav. Such an intensive coordination of forces and resources has so far not been usual in the pre-production stages. The first step in that direction is a joint Czechoslovak-Soviet laboratory for research on dyes established in 1984 at the Association for Marketing of Anilin Dyes in Pardubice-Rybitvi. Since it was established, it conducts research on the application of technologies and assorted kinds of organic dyes.

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EAST EUROPE/CHEMICALS/PHARMACEUTICALS

NEW GDR CERAMIC MATERIALS, APPLICATIONS

East Berlin PRESSE-INFORMATIONEN in German No 105, 9 Sep 86 pp 3-4

[Article by Klaus-Dieter Rotter, department head in the Ministry for Science and Technology: "New Ceramic Materials for Technical Applications"]

[Text] New materials with new technologies are increasingly determining the material and energy economy of our products. That is an important contribution to ensuring the improved performance of our national economy with constant or declining amounts of raw and other materials and energy. Ceramic materials thereby hold a dominant position, for they are characterized by great temperature stability and resistance to corrosion and wear and can be manufactured mainly from domestic raw materials. At the same time, ceramic materials determine to a considerable extent the pace and level of the development of key technologies, especially microelectronics and automation technology.

Making Use of Favorable Characteristics

Ceramic wear and carrier materials are used in large-scale integrated circuits. Requirements such as high insulating resistance, good mechanical strength, heat conductivity, and vacuum tightness are fulfilled, developed and manufactured at the VEB Ceramic Works Combine in Hermsdorf through special ceramic materials based on aluminum oxide. Other ceramic materials based on iron oxide or barium oxide take over magnetic functions and are thus used in efficient computing systems or drive motors for electronic equipment.

Ceramic materials made to order are the focus of research worldwide. For centuries, the production of ceramics was more a matter of alchemy than of science. It is only in our time that the complicated manufacturing processes are being researched exactly and are leading to surprising results, often as the prerequisite or result of the application of key technologies. In the VEB Ceramic Works Combine in Hermsdorf, for example, a research team developed a special aluminum oxide ceramic for human medicine and brought it to the point of application. Together with physicians from Rudolf Elle Hospital in Eisenberg, it successfully employed different types of hip-joint prostheses. So far, 10,000 patients have received such prostheses and been freed from serious ailments of the hip joint. Ceramic materials for such purposes are characterized by great strength and good compatibility.

The GDR has a rich tradition and experience in ceramics production. This combined with significant promotion by the party and government as well as the will of the collective leads to results that go beyond what is known internationally. The material "ilmavit 40(R)" developed at the VEB Technical Glass Combine in Ilmenau ia a glass ceramic that gives the materials engineer new ways to process and apply silicate materials. Its advantages are its good mechanical workability and chemical resistance to aggressive media. "Ilmavit 40(R) can stand temperatures up to 700 degrees Celsius and has shape and age stability. A special advantage is the possibility of coloring through glazing and enamels and the application of composite casting with selected types of steel and cast iron. Thus this material has already gained applications in the construction of chemical plants--pump housings, for example-- in shipbuilding, and in such consumer goods as fittings and handles for ranges and cooking utensils. The directive of the 11th SED Congress foresees the putting into operation of the capacity to produce 1,000 tons of this new material by 1990.

Intensive Research

In more than 20 scientific installations and enterprises in the GDR, including the Freiberg Mining College, the VEB Ceramic Works Combine in Hermsdorf, and the VEB Fine Ceramics Combine in Kahla, teams are working intensively on the development and productive utilization of new technical ceramic materials for constructive applications. In the VE Scientific-Technical Ceramics Plant in Meissen, a technical school was recently put into operation by a team of young researchers. This team is working with great commitment on questions involving materials, the development of expedient production technologies, and on initial model products.

Materials based on silicon carbide and silicon nitride have substantial mechanical strength even in the high temperature range. They are more than equal to high-alloy quality steels. Added to that are the very good friction and wear behavior, the chemical stability, and the resistance to corrosion. The use of such materials is being prepared for burners and heat exchangers as well as bearing and seal elements.

A challenge for basic research and the subject of the close research cooperation of industry and scientific installations is to diminish the disadvantages of ceramic materials, disadvantages that still stand in the way of broad industrial use. The great brittleness of the ceramics now known has an unfavorable effect on the shock and impact resistance of components.

The 5-year plan directive of the 11th SED Congress indicated the growing importance of construction materials based on ceramics. Therefore, the production and application of new ceramic materials are to be prepared by 1990. The scientific-technical tasks introduced and prepared with great intensity in the scope of a government contract in the state plan for science and technology serve this goal.

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EAST EUROPE/CHEMICALS/PHARMACEUTICALS

CSSR-USSR COOPERATION IN CHEMICAL RESEARCH, PRODUCTION

Prague TECHNICKY TYDENIK in Czech 23 Sep 86 p 3

[Interview with Vaclav Braunstein, director of the international relations department of the CSR Ministry of Industry: "Cooperation in Chemistry"; date and place not given]

[Text] In March an agreement on CSSR-USSR cooperation in the chemical industry for 1986-1990 was signed in Moscow. We spoke about it with Vaclav Braunstein, director of the international relations department of the CSR Ministry of Industry.

The agreement covers scientific-technical and scientific production cooperation in 27 areas, primarily chemical reactivity and especially pure chemical substances, organic dyes and additive substances for textiles, glass fibers, polyethylene products, chemical additives to polymers, plastics, chemical fiber production, chemistry in housing and improved management in the chemical industry.

[Question] What enterprises are especially affected by cooperation?

[Answer] Those chiefly concerned in the CSR are Lachema Brno, Unichem Pardubice, Chemopetrol Prague, Czech Rubber and Plastics Works Gottwaldov and Sklo [Glass] Union Teplice.

[Question] Could you be more specific about some of these?

[Answer] The latest form of cooperation in research and development is the establishment of scientific production associations, such as Interreaktiv between Lachema Brno and Soyuzreaktiv in Moscow. Their objective is to satisfy the requirements of both countries to the maximum degree for pure chemical and extra-pure chemical substances, to ensure high quality production, to make exports to other countries possible, and to coordinate research and development.

[Question] There already exists a joint Czechoslovak-Soviet color research laboratory in Pardubice. What is its purpose?

[Answer] To increase the export of dyes to the USSR and replace organic dyes from nonsocialist countries with imports from the USSR; to unify the quality

rating of dyes with uniform, standardized methods. Application of some of our selected dyes to the Soviet textile industry is also involved. The agreement was concluded, in the meantime, for 1985-1988.

[Question] What about cooperation in developing the technological process of phthalic cyanine [PC] pigments?

[Answer] In the last 5-year plan the State Commission for Technological and Investment Development in the CSSR and the Ministry of Chemical Industry in the USSR already signed an intergovernmental agreement on cooperation in developing a technological process for PC pigments. PC pigments are advanced organic pigments with high thermal stability and low solubility in organic solvents. This permits their use in baking varnishes for the auto industry, in the printing and reproduction industry, and in dying plastic materials and synthetic fibers in materials. The objectives of the agreement are research, testing, planning and design of technological processes. The technologies are to be developed by 1988 and the design bases are to be worked out for production of phthalic cyanine of copper, blue and green formulas of PC pigments, etc.

[Question] What are the goals of the Czech Rubber and Plastics Works?

[Answer] The Board of Specialists directs cooperation between the Research Institute of Rubber and Plastics Technology in Gottwaldov and the Scientific Research Institute of the Rubber Industry in Moscow. Their aim is to satisfy both countries' requirements for technical products of rubber. This involves soles for the footwear industry, container closures for medical purposes, gaskets for the automotive industry, etc. We work on the development and subsequent production, of vulcanizing equipment which will be used for assembly-line production while the Soviets work on development of the technological process of vulcanization and supply of raw materials. The basic advantage, when handling liquid rubber, is that this cooperation will lead to full automation of production by computers, shorten the time of the vulcanizing cycle and thereby achieve savings in energy and labor and increase labor productivity. It will also enable production of items of complex design, which is impossible with regular rubber.

[Question] And what are prospects for the future?

[Answer] The intergovernmental agreements negotiated between the CSSR and the USSR will have a decisive impact on the development of direct relations between ministries and enterprises and will significantly increase the enterprises' authority and simplify their mutual relations and the relations of R&D organizations. It will also simplify contacts between specialists, transfer of data, and mutual economic accounting arrangements for work performed. It will affect, for instance, the Chemical Plants of Czechoslovak-Soviet Friendship in Litvinov and the production association in Bud'onovsk for the production of polyethylene; the Paints and Varnishes Enterprise in Prague and the Tetron Tbilisi production association for the production of paints, varnishes, etc.

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EAST EUROPE/COMPUTERS

YUGOSLAV COMPUTER FIRMS JOIN FORCES

Zagreb VJESNIK in Serbo-Croatian 3 Oct 86 p 5

[Article by Stane Pucko: "The First Computer Marriage"]

[Text] All the advantages of association among the ISKRA and GORENJE computer producers are clear. One gets 2,000 dollars for a 30X20 centimeter microprocessor module, the same as for a YUGO exported to the United States.

After many years the rivalry changed into bashful flirting. After a few years of going steady, a long-expected computer marriage took place in Slovenia. Effective 1 October ISKRA-DELTA, which is part of the Complex Organization of Associated Labor ISKRA, and the facility producing processing and computer equipment that is part of the Complex Organization of Associated Labor GORENJE, have formed a fraternal union and, we hope, thereby initiated a process of necessary technological association of computer producers in Yugoslavia. After joining with GORENJE, ISKRA's personnel, technological, production, and commercial capabilities have nearly doubled. It is not necessary to point out especially the great advantages that have accrued to the variegated group comprising the Yugoslav computer industry.

Taking into account the many years that had to elapse before GORENJE and ISKRA understood the need for close mutual cooperation and association, it would be dangerous to predict how quickly the marriage will expand into a family. Various multinational companies, for whom Yugoslavia has been fair game for over two decades, have grown roots in our electronic industry that will be impossible to eradicate overnight. It is questionable whether ISKRA and GORENJE would have ended up under the same roof if they have not been forced to embrace.

Great Ambitions

After unsuccessful attempts to join forces in the computer industry in the late 1970s and early 1980s, the Executive Council of Slovenia became fed up with the various excuses and presented the Assembly with a proposed law on association of computer firms in the republic. Even though after that law and the corresponding self-managing agreement were adopted cooperation among the eternal competitors became more fruitful, almost 4 years were needed before there was a true association of computer technologies. As soon as the law in

question was adopted, it was said that the association was not intended to be confined to the republic boundaries; on the contrary, there were ambitions to include all of Yugoslavia. People in ISKRA and GORENJE are claiming the same thing today. While the foremost candidate for inclusion in the new computer association is the Maribor BIROSTROJ, offers have been sent to various Yugoslav computer manufacturers.

The ambitions of the new organization, which under the name ISKRA-DELTA has kept its membership in the Complex Organization of Associated Labor ISKRA while at the same time joining the Complex Organization of Association Labor GORENJE, are clearly far-reaching. It has even been pointed out that the strengthening of family may make possible the establishment of a new computer complex organization of associated labor, a Yugoslav organization for the development, production, marketing, and maintenance of high technology.

Even before the merger GORENJE and ISKRA had gathered valuable export experience with noteworthy results. Neither one, however, was able to offer complete computer systems which sell for much more. The joining of forces has overcome even this obstacle. On the basis of past cooperation, a new family of computers was created which will compete in the world under the commercial label IDC (ISKRA DELTA COMPUTER). This is the name of the firm founded in Austria by ISKRA-DELTA.

Naturally, the partners did not enter the marriage empty-handed. ISKRA-DELTA has a so-called critical mass of experts and its own technological know-how to build computers, as well as established business links abroad, a development unit in the well-known Silicon Valley in the United States, its own education facility, etc. GORENJE has processing equipment, excellent technical personnel, and a well-developed foreign trade and sales and service network.

A New Computer System

The basis for the merger is certainly a great integration of know-how that complements production capabilities; the goal is the sale and purchase of expensive know-how. "Our new computer system program, which we will demonstrate in the middle of October in Zagreb at the INTERBIRO-INFORMATIKA 86 show, is the best answer to those who feel that the Yugoslavs are not able to compete on an equal basis with world computer firms. That is simply not true and we will prove it," says IDC General Director Engineer Janez Skrubej. High technology exports are very profitable. We get 2,000 dollars for a 30X20 centimeter microprocessor module, the same as for a YUGO. This is the advantage behind high technology, and IDC will take advanage of it. If we want to compete with multinational companies and other producers, however, we must behave as they do. Merger with GORENJE falls into this context.

The new organization has approximately 2,000 employees. Even prior to this ISKRA-DELTA had the largest concentration of information processing know-how in Yugoslavia. It had over 5000 highly or very highly trained workers. Its position is even stronger now, and the advantages vis-a-vis the competition greater. Naturally, the purpose of the merger is not to deepen the chasm between Yugoslav computer producers because competition among them is not only

senseless but also inpossible since there is very little maneuvering room on the difficult course on which the multinationals compete. The intent behind the action can be simply illustrated with the following comparison: one can get between 400 and 800 dollars for a ton of steel on the world market, while the module for which ISKRA-DELTA gets 2000 dollars weighs only a few ounces.

We must, however, be realistic. While this fusion will not cause any upheavals in the world or European computer business circles, it is significant for us because it could help in having the world of technological revolution bypass us as little as possible.

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EAST EUROPE/FACTORY AUTOMATION

USE OF FLEXIBLE MANUFACTURING SYSTEMS IN BULGARIA

Sofia POLITICHESKA AGITATSIA in Bulgarian No 18, Sep 86 pp 16-18

[Article by Engineer Vasil Dyulgerov: "FMS - Basis for Automation of Discrete-item Manufacturing"]

[Text] Automation of discrete-item (discontinuous) manufacturing is entering a new stage of development. There is a growing tendency toward industrial reorganization on the basis of contemporary automated manufacturing systems developed due to microelectronics and electronic data processing.

Flexible manufacturing systems (FMS) are known to guarantee consistent high quality and reliable production, to elevate the entire chain of the manufacturing process, to exclude the subjective factor, to increase productivity sharply, and to offer the possibility for maximum reduction of fixed capital and expenditures when starting new production. They ensure a fast transition to new duties at the setup of new production and contribute to a timely response to market demands.

Based on the concept of automation technology, flexible automated manufacturing allows one to: ensure 2 and 3 shifts of work of the same machines on an automatic schedule: increase the loading coefficient: increase significantly productivity secondary to comprehensive automation of manufacturing processes: decrease the time spent reprogramming the machines: and optimize the loading of basic materials which leads to a shorter cycle of manufacturing.

FMS presume the highest possible level of internal balance of manufacturing. Their is, above all, the problems of rapid renewal of production. The concept of flexible manufacturing systems successfully combines such contradictory principles as mass production and variable product lists. FMS ensure production flexibility on two levels: the ability to reprogram within the limits of a given list and the ability to reprogram when the lists are changed.

The social significance of these systems is not limited to or largely their ability to respond more rapidly to changing demands and to satisfy increasing needs. Most important, FMS help change the nature of work. Man's participation in the field of manufacturing in general acquires a new significance: the transition from performing the technical functions of

touch-labor to creative, more meaningful, and consequently more productive work. Flexible manufacturing systems will show how to remove the divisions between physical and mental work and how science transforms itself into a direct production force. FMS help increase society's intellectual potential and do not replace man. He simply transfers to them the functions which they will perform better: technological, transportation, as well as logic control automation. The transfer of functions is accompanied and ensured by the expansion of the sphere of man's intellectual activity. For this reason, automated manufacturing, including that which completely eliminates manual labor, does not mean that man will be left with nothing to do. At this point, the problem of getting qualified personnel acquires primary significance. It has two interconnected parts: training personnel to devise FMS and training personnel to use them. FMS are to be elaborated by qualified specialists capable of combining the scientific, applied, and practical knowledge of entire fields and subspecialties in a single creative process. Highly qualified technologists and operators, specialists in electronics, programming, and repair are needed to service FMS. Production managers must learn to deal with a large stock of automated machines and equipment, to ensure technical maintenance, and to adapt the entire work organization to this high level of automation.

The design, elaboration, and implementation of FMS requires in principle new relationships among the designers, manufacturers, and consumers; it is necessary to coordinate the efforts of many organizations and enterprises. The development and implementation of FMS must be preceded by well-founded reasons and thorough technological and economic analysis so that the use of complicated and expensive equipment does not create difficulties for the enterprise and decrease the return on capital investment. The user of FMS must determine precisely the exact production goals for the elaboration of these expensive machines and equipment, to explain the product list being processed, and to ensure full utilization of the system and its integration with other production sectors.

When the organizational aspects of development and implementation of FMS in a particular factory are reviewed, it must be clear that this is not a single independent action, but part of a continuous process of the factory's technological adaptation to effect accelerated progress in manufacturing. For this reason the most important work on the development of FMS must be accomplished in the factories, industrial plants, and conglomerates which must also participate actively in all stages of this process.

Automation based on FMS is the groundwork for the BCP's entire economic and social policy and the object of special attention in the country. In March 1983 the Council of Ministers approved a national program for accelerated FMS development and implementation for metal cutting processes. During the years of the 9th 5-Year Plan for the automation of discrete-item manufacturing we will implement FMS for: machined processing of workpieces by lathing (for fuselage, axletree, disk, and mixed parts), preparation processes (hydroplastic processes, centrifugal founding, founding under pressure, cutting with laser and plasma arc, and welding), assembly processes (basically in the electronic equipment industry), and metal and ceramic manufacturing.

At the present time FMS for machined products are best suited for implementation since there is accumulated experience, the methodology is developed to a significant level, and the necessary equipment is available.

The development of integrated manufacturing on the basis of microelectronics and electronic data processing, as well as the possible use of artificial intelligence, and more specifically, the use of expert systems in manufacturing, will undoubtedly expand the possibilities of future FMS. The scientific research and many practical methods of leading firms prove that their future development depends on computer-integrated manufacturing systems which consist of the integration of hardware, software, data banks, and communication systems.

The development of FMS as one of the main factors for production intensification is an exceptionally important national task. The readjustment toward economic considerations and improvement of the style and methods of work under the conditions of comprehensive automation in manufacturing is very important. The work on developing FMS includes a whole complex of measures with scientific, technical, manufacturing, technological, socioeconomic, and ideological basis. The transition of industry toward accelerated development is an objective norm. For this very reason all levels of management and every participant in this process must accept comprehensive automation as a vital necessity with the strong conviction that the problems posed can be solved regardless of their complexity.

The all-around acceleration of progress in science and technology and the elaboration and implementation of fundamentally new types of equipment and technological methods are an important economic strategy of the socialist bloc countries at present.

The comprehensive program for the progress of science and technology until the year 2000 accepted by CMEA member countries is the foundation on which a common policy regarding science and technology is put into practice. It offers the ability to use combined efforts to solve rapidly the most important scientific and technological problems and implement results achieved in the national economy.

The teamwork of the CMEA member countries in computer-integrated manufacturing will be concentrated above all on developing systems for automated design and control of technological processes and developing highly effective flexible manufacturing in key areas of industry and other branches of the national economy.

Large-scale implementation of the resources for comprehensive automation in the national economy, and specifically of flexible systems, will make it possible to increase significantly work productivity, quality, and the

competitive power of production, as well as the development of automatic factories in the future. Realization of these priority trends in technological progress will cardinally change the nature of work and at the same time will improve the quality of manufacturing.

Engineer Vasil Dyulgerov

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EAST EUROPE/SCIENTIFIC AND INDUSTRIAL POLICY

CSSR GEOLOGISTS PERFORM WORLDWIDE SERVICES

Prague TECHNICKY TYDENIK in Czech No 27, 1 Jul 86 pp 1, 2

[Article by Dr Josef Pravda, Chairman, Czech Geological Office: "Our Geology in the World"]

[Text] For more than twenty years Czechoslovak geology has played a role abroad and obtained rich experience in this area. There is no continent where our geologists have not set foot. It is worth taking a look at our work abroad where our work will be focused in the years ahead.

While this was mainly the activity of a few specialists twenty-five years ago, it is now the business of hundreds. Starting from the scientific and technical cooperation which prevailed at the time, technical capacities developed in geology which now constitute a commercial export and not simply on a small scale, as indicated by the 1985 report on the export of geological research work through STROJEXPORT. The foreign exchange earnings of this activity are significant. Exported work to the nonsocialist countries alone is valued at Kcs 400 million. If we add the exports to fraternal countries, the value climbs to Kcs 600 million.

The participation of our geologists and geological research employees in the development of the national economies of particular socialist countries is, of course, our duty. We can only say that we fulfill it responsibly and value it most highly.

Geological Mapping in the CEMA Countries

The largest number of Czechoslovak specialists have been working in the Mongolian People's Republic for more than twenty years. We founded a joint venture known as Mongol-Czechoslvak Metal. Geological research is gradually giving way to building mining and processing facilities. Czechoslovakia exports fullerite and a tin concentrate from Mongolia. Preparations are under way to build a plant for mining and processing wolfram ores. There are also plans for graphite, pyropes, semiprecious stones, and possibly even rare earth elements. Alongside our work in this area, the first international geological expedition founded by member countries of CEMA more than 10 years ago is active in Mongolia. Annually Czechoslovak geology sends 20-25 specialists and aids by supplying technology and equipment.

In the Socialist Republic of Vietnam our geologists are taking part in the multilateral effort of CEMA countries--Geological Mapping of the Territory of the Socialist Republic of Vietnam--and activities of bilateral interest. This mainly involves rare earth elements and semiproducts as well as pyrrhyllites. Last year the first stage of construction of a plant for manufacturing and repairing geophysical apparatuses was completed. This plant will also manufacture instruments designed by us. Geophysics Brno has already trained fifteen Vietnamese specialists. We are also preparing to participate in the utilization of thermal waters by the Vietnamese Health Service and seek to participate in the gradual development of the Vietnamese spa system.

In the Lao People's Democratic Republic we have participated for several years in prospecting for sapphire deposits, mapping the shores of the Mekong River and its left tributaries for gold and certain other elements, particularly tin and wolfram. We are assisting with other projects as well, particularly in the province of Bo Keo. Part of this cooperation involves the education of future Laotian specialists which we approach extremely seriously.

Czechoslovak specialists have also been working in Cuba for more than 20 years. They have earned a good reputation in geological research and surveying and the mining industry. Here, too, our geologists are working as part of the CEMA program for the geological mapping of Cuba. They are also participating in activities in accordance with bilateral agreements reached between the CSSR and Cuba. We have completed mapping the Escambray mountain range and the area up to the city of Sancta Spiritus; we are searching for ores containing copper, lead, zinc, gold, silver and chromium. We are helping with the construction of a new processing plant for chromium ores exported to Slovak magnesium plants. In the future we will explore other deposits in Cuba.

Mozambique and Ethopia are among the countries with a domestic and external socialist orientation. Our geological work in these 2 countries is focused on explorations for apatite, graphite and rare earths. We assume that we will build common mining facilities and carry out work as well as prospecting for other types of mineral materials.

We Are Gaining New Markets

Our work in Iraq, Iran, Algeria, Libya, Togo, Benin, Austria, the FRG, the Yemen People's Democratic Republic, the countries of Latin America, the United Arab Emirates, Kuwait, and the Syrian Arab Republic has a commercial basis. We are trying to obtain trade with India, Indonesia, and even Australia. The range offered is very extensive and depends, of course, on the client's wishes: from exploring and surveying dam profiles to the construction of valley dams, passing by way of the grouting of dams, wells, and deposits of mineral materials, and establishment of construction meeting technically demanding engineering work.

For example, we are making the vertical ventilation and drainage bores for the Austrian Tauen-Autobahn in mountain ranges so that the highway will not freeze over inside tunnels and will remain passable even in winter. Several years ago we won the international competitive bidding for boring on the Egyptian

shore isthmus, a project involving the effort to irrigate the Sahara. In Austria and Brazil we have solved the problem of decreasing the water level of dams in high mountains by means of a tunnel and secure bore to the bottom of the lake; in Venezuela we had the task of eliminating dangerous mountain debris that had shifted up above the high mountain dam. We could go on and on.

Most of our work, however, is less adventurous. We are boring wells in Libya to make thousands of hectares of land more fertile, conducting geological mapping, and prospecting for and evaluating deposits of non-ore raw materials. Similarly, in recent years our work in Iran and Algeria has revolved around wells for potable water. Iraq has employed us for mapping, seismic works and, more recently, preparation of oil digs. In Austria and the FRG we are establishing construction and engineering-geological work. In Syria we will be mapping an extensive area and conducting geophysical work. We are digging wells in Kuwait, Togo, and Benin. It is interesting to note that our wells in Africa are used by many breweries. Our specialists are working at many universities in Middle Eastern and North African countries. Many are participating in various UN projects.

How Many Languages Do You Know...?

Our work is becoming more and more extensive year by year. Therefore, the specialist's education has its specific points. At Charles University and the Mining University in Ostrava, language instruction has been broadened. French, Spanish and Portuguese have been added to the traditional Russian and English. Each year we evaluate the situation and, in agreement with the school, determine the allocation of new students for language study. We organize postgraduate studies, particularly for the modern method of applying geophysics and mathematical methods in geological practice. Special courses also help in this process. For further development of cooperation in mineral mining, we are organizing the education and training of foreign specialists in Czechoslovakia. We organize management courses for Cuban and Nicaraguan technical specialists and are broadening this practice even more. A course organized every two years by Geochim-UNESCO-CSSR for participants from developing countries has become a regular feature. Interest in participation in this course has been increasing year by year. It is becoming a good advertisement for our geological school. In the course of his two-month stay a participant in these courses becomes acquainted with our surveying and mining plants.

Broadly-developed scientific and technical cooperation with CEMA countries is also very important to us. Five-year bilateral agreements and annually concluded concrete plans for cooperation with the USSR, the GDR, Poland, Bulgaria, Hungary and Romania (and similarly Yugoslavia) create conditions for accepting and transferring the best knowledge and information. They lead to the acceleration of progress. Geologists have an extensively developed international cooperation and Czechoslovak geology is a sought-after partner in many countries. That is why we have accepted agreements in cooperation with Austria and Greece, France and Finland, and are preparing others. Contacts are being successfully developed with the Nordic Countries--Sweden and Norway--as well as with Belgium and Great Britain. There are preparations under way for concrete thematic cooperation with the Canadian Geological Service.

Until now the activities of Czechoslovak geologists abroad have been very successful. We will do everything in our power to continue to develop those activities. This type of work also contributes to mutual understanding among nations. Through this work we wish to fight for permanent peace.

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LATIN AMERICA/SCIENTIFIC AND INDUSTRIAL POLICY

ARGENTINE UNIVERSITIES TO BE LINKED BY COMPUTERS

PY282307 Buenos Aires BUENOS AIRES HERALD in English 28 Oct 86 p 3

[Text] (AR) [not further identified]--The creation of an Argentine University Consortium, aimed at integrating local state and private institutions with the most important academic centres of the world through a computerized system, was recently announced by Apple Argentina and Softlider S.A.

The project was developed by Apple Computer Inc. and will connect Argentina to the Latin American Regional Consortium and the Apple International University Consortium.

Forty-nine universities (26 state and 23 private) were invited to join in the programme, which means that around 400 university departments nationwide will join the system.

During a meeting held last week, the Caracas Metropolitan University Academic Vice-Chancellor, Johny Benaceraf, and the Long-Distance Education Director from the Chilean Catholic University, Alfonso Gomez, gave their views on similar experiences held in their countries.

Apple Marketing Manager for Latin America Javier Ergueta and Apple Products Manager Christian Barrios also visited Buenos Aires to explain the advantages of the project, while Softlider S.A. President Enrique Duhau and Marketing Manager for Latin America Carlos Scaffino provided information on the technological advances to be introduced by the system.

Scaffino stressed the system will enable universities, students, and professors to communicate with the rest of the world and exchange information at low cost.

Currently, the Latin American Consortium is made up by Chile, Venezuela, Uruguay, Colombia, Peru, Ecuador, Mexico, Costa Rica, Puerto Rico, and Panama, while the International Consortium includes 35 world-known universities such as Harvard, Columbia, Cambridge, Munich, and Tel Aviv.

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LATIN AMERICA/SCIENTIFIC AND INDUSTRIAL POLICY

ARGENTINE OFFICIAL DISCUSSES INFORMATICS SECTOR SITUATION

PY281657 Buenos Aires TELAM in Spanish 1303 GMT 28 Nov 86

[Text] Buenos Aires, 28 Nov (TELAM)--Informatics and Development Under Secretary Carlos Correa has stated that Argentina has lost valuable time in the informatics area because it has expelled trained professionals and scientists, and that Argentines allow time to pass without becoming trained.

The official said that nevertheless, before the end of the century we may be able to overcome the backwardness in this area and become protagonists in the field instead of mere observers.

Correa said that we are making a great effort to train Argentines in informatics technology which is revolutionary in many aspects and can lead to political and economic independence and to development.

Speaking to "NOTICIERO FEDERAL" which is broadcast by ATC, the informatics under secretary said that publicity tends to exaggerate the possibilities of informatics. He said that there is the belief that computers are like magic. People believe that you just have to turn on a computer to modernize a country.

He explained that achieving technological modernization through informatics calls for an administrative reorganization and exhaustive work which goes beyond the mere turning on of a computer.

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LATIN AMERICA/ SCIENTIFIC AND INDUSTRIAL POLICY

SARNEY REAFFIRMS INFORMATICS, CAPITAL POLICIES

PY011443 Rio de Janeiro O GLOBO in Portuguese 31 Oct 86 p 20

[Text] Brasilia -- President Jose Sarney yesterday complained to two deputies, Joao Hermann and Joao Cunha -- both of whom are PMDB [Brazilian Democratic Mobilization Party] deputies for Sao Paulo -- that national and foreign groups are pressuring him to modify the foreign debt negotiations, to change the informatics reserve market law, and the remittance of profits law. This was explained by the two deputies at the end of the meeting they held with the president at the Planalto Palace.

According to Joao Hermann, the president referred to some businessmen saying, "people in this country must get used to earning no more than a 20 percent profit per month."

According to the legislator, Sarney also said that he is being pressured by foreign sectors, which want to increase their participation in the Brazilian domestic market, and by the financial system. He also said that he is confronting threats that the United States and Eastern European countries will implement retaliatory measures against Brazilian products.

According to Hermann the president asserted that he will not yield to these pressures and he told Deputy Joao Cunha that "the reserve market law for informatics is here to stay."

According to Cunha, Sarney also told him that he will not change his conduct of the foreign debt negotiations, that they will be carried out without the IMF's monitoring. Foreign sectors are exerting pressure regarding the Brazilian law that regulates the application of foreign capital in the Brazilian economy. Sarney reassured Hermann that he has no plans in amending this law "because it has been in force for 30 years."

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LATIN AMERICA/SCIENTIFIC AND INDUSTRIAL POLICY

MINISTRY DENIES FIBER OPTICS DEAL WITH USSR

PY051750 Sao Paulo O ESTADO DE SAO PAULO in Portuguese 4 Nov 86 p 42

[Text] During his visit to the Soviet Union, due to begin on 24 November, Science and Technology Minister Renato Archer will not negotiate the sale of Brazilian fiber optics to Soviet enterprises. Science and Technology Ministry social communications coordinator, Jose Monserrat Jr, gave that assurance and denied that a $17-million fiber optic deal has already been struck between the Brazilian and Soviet Governments.

According to Monserrat, Minister Renato Archer will visit the Soviet Union in response to a Soviet Government invitation to get acquainted with the new technological developments in that country. Although the minister does not intend to sign any agreements during this trip, he will sound out the Soviet authorities for future possible accords and the sectors in which they are interested. Monserrat asserted that "the minister will go to identify possibilties for negotiations," and added that Minister Archer will pay special attention to space and biotechnological research. The coordinator concluded by saying that in the area of informatics there will be only an "exchange of information."

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LATIN AMERICA/ SCIENTIFIC AND INDUSTRIAL POLICY

PRENSA LATINA INTERVIEWS PRESIDENT SARNEY

PA051404 Havana PRENSA LATINA in Spanish 2011 GMT 4 Nov 86

["Exclusive" interview with Brazilian President Jose Sarney by unidentified PRENSA LATINA correspondent in Brasilia; date not given]

[Text] [PRENSA LATINA] Several topics in Brazil's domestic policy have grabbed the attention of international public opinion during the last few weeks; namely, the enforcement of the law on agrarian reform, relations with the Brazilian church, and the law on the second phase of the Cruzado Plan. Will you refer to these matters and elaborate on the government's policy with respect to them?

[Sarney] Brazil is making great efforts to overcome several distortions that had developed throughout its history and more specifically during recent years, when a great impetus for development coincided with 21 years of authoritarian rule.

I took over power at a time when three great crises were together threatening the base of support of the Brazilian state itself: a political crisis related to the difficulties in making a peaceful transition from authoritarianism to a democratic, participatory regime; an economic crisis characterized by a serious foreign debt problem, recession, unemployment, and high inflation rates that were paralyzing the production apparatus; and a social crisis, which was a historical legacy exacerbated by the recession and by a social and regional concentration of income.

The government's task was to defuse these crises and to chart the course for long-range solutions. We first carried out an institutional transformation, abolishing the authoritarian legislation, calling elections for a constituent assembly, and granting broad freedom of speech as well as freedom to organize political parties.

We launched the agrarian reform as a means of correcting the distortions in the countryside, of promoting the modernization of the country 's landholding structure, and of increasing agricultural production. We established assistance programs to immediately begin a process of redistribution of income geared toward extreme cases such as those of child nutrition.

I believe the basis for the transformation we began to carry out is precisely the decision to fully resume the management of our economic policy. We opted to restore growth as the only way to resolve serious social problems that had piled up, the only way to promote the distribution of income, to end employment, and to stave off the threat of a recession.

The Cruzado Plan constituted the definition of concrete, long-range measures to build up confidence in production and the value of work and to counter the spirit of speculation that had gripped the country.

We knocked down inflation with a single stroke and froze prices. Salaries then took on real value when the erosion caused by the inflation was stopped. The economy has again attained growth rates of 7-8 percent per year and Brazilians' consumption pattern has improved.

The difficulties naturally faced by an ambitious plan like this are being tackled with determination. Unemployment has dropped to unprecedented levels and it can be stated without fear of contradiction that we are beginning to carry out a process of redistribution of income, the consequence of which will be stabilization of the social base and the creation of conditions to consolidate our democracy and to strengthen our political institutions.

[PRENSA LATINA] What is the significance of the coming elections for the new republic, particularly that of the election of a constituent assembly to draft a new constitution?

[Sarney] The coming elections represent the culmination of processes leading to the redemocratization of Brazil, not only because of the climate of freedom in which they are held, with the participation of all parties and ideological currents, but also fundamentally, because they will define the composition of the National Constituent Assembly, which has the mandate to give the country a new political, institutional, and judicial shape. We will update our political institutions in order for them to become means of consolidating not only democracy, but also the country's social and economic progress.

This is the fundamental point I would like to stress: Democracy is not an end in itself in Brazil. It is an instrument with which Brazilian society seeks to carry out the economic and social transformations that will allow the country to attain a degree of development that will be homogeneous and compatible with the people's needs and aspirations.

[PRENSA LATINA] The Brazilian approach to the foreign debt continues to be of foremost importance. How does your government plan to overcome this obstacle to development, bearing in mind the problem posed by the amortization of capital and interest payments?

[Sarney] On the question of the foreign debt, the Brazilian Government advocates a political dialogue that would include such issues as: joint responsibilities of debtors and creditors, the gearing of debt payments to the economic abilities of debtors, a reduction in interest rates an spreads [previous word in English], long term refinancing, and a review of conditions posed by multilateral credit and financing agencies, particularly the IMF and the World Bank.

The debt to the banks was the subject of partial refinancing agreements in March. Regarding the official debt, in May Brazil submitted to the Paris Club a proposal to begin repaying overdue maturities and to reschedule payments to creditor countries. The government pursues the policy of not accepting economic adjustment policies of a recessionary nature.

With the adoption of the Cruzado Plan, the Brazilian Government made the necessary domestic adjustments, thereby ensuring industrial production growth, the end of speculation in the financial market, the control of inflation, in short, economic reorganization.

The Brazilian Government feels one of the current obstacles to development is the heavy transfer abroad of foreign exchange to service the foreign debt. However, we feel we can substantially reduce that transfer through negotiations with creditors and by seeking creative solutions together with the entire international community. I have stated, and I must repeat, that we will never pay the foreign debt with the hunger of our people or a recession.

[PRENSA LATINA] There have been talks with the United States regarding the computer law. What is Brazil's position and the current situation?

[Sarney] The National Congress passed Brazil's computer law almost unanimously on 29 October 1984. The law's explicit objective is "to train the nation in computer activities for the benefit of the social, cultural, political, technological, and economic development of Brazilian society." Law No 7.232 constitutes Brazil's response to the challenges imposed by technological progress and national development and which require knowledge of advanced technologies.

Moreover, the law is totally compatible with the international commitments Brazil has signed and promotes a significant development in Brazil's computer sector.

Regarding the talks with the United States, the Brazilian Government explained the context and scope of the information law, including the controls provisions. The objective of the talks is not to negotiate amendments to the computer law.

[PRENSA LATINA] How important do you feel the re-establishment of diplomatic relations between Brazil and Cuba to be?

[Sarney] For the two countries, the re-establishment of relations seeks to make our foreign policies universal. It is normal in the international lives of countries to have diplomatic relations. Not to have such relations is regarded as an exception to the rule.

Regarding our case, there has been not only an overall positive development, but our mutual interests have also significantly increased.

In bilateral and multilateral terms, we are countries with global interests, because we have an active diplomacy and common interests involving trade in some raw materials and basic products that economically complement each other. That is why I am sure we will have the conditions to develop a fruitful relationship based on the interests of the two countries, always in a constructive manner and in a climate of mutual respect.

For Brazil, it is very important that it be so, since we want to conduct international relations in an atmosphere of harmony and political and ideological pluralism which we are experiencing at home and which is to be credited for the major social and economic changes we are implementing. We are sure we will have a relationship of friendship and broad cooperation with Cuba.

[PRENSA LATINA] Do you feel these ties will serve to promote the plans for economic integration among the Latin American countries?

[Sarney] Latin American integration has been one of the chief aspects of Brazil's foreign policies. We have treated it as corollary of the priority which I have given to relations with Latin America during my administration. We have taken specific and highly important steps in this regard, as can be seen in the agreements signed recently with Argentina and Uruguay. Our objective is to expand that process in all respects so as to create a true, dynamic Latin American market.

However, we must consider the fact that the cultural, historic, political, and economic diversity among the area countries leads to a gradual, pragmatic, realistic, and necessarily flexible approach in this field to ensure harmony in the process of integration.

As I see it, in that way each step must be in line with the current reality to avoid the creation of unjustifiable expectations which will only cause frustrations.

For example, I believe the existing mechanisms within ALADI are adequate to implement that process in our region because these mechanisms take into consideration the unequal levels of economic and technological development existing within the member countries by facilitating preferential bilateral agreements that are flexible and that lack specific time limits.

I am referring to the partial scope [alcance parcial] agreements which are easier to implement. In the future, their expansions will prove the advisability of more complex bilateral agreements like the ones I mentioned before between Brazil and Argentina, which at present are at the initial stage of their implementation.

As for Cuba, Brazil suported its entry into the ALADI as an observer, considering that this is a positive step toward the possible expansion of Cuba's participation in the mechanisms for regional integration. It is worth remembering that these mechanisms have their own dynamics, which to a certain extent are different from the dynamics of bilateral relations among several countries of the region.

[PRENSA LATINA] How do you feel about the outlook for the integration of Brazil with Argentina, and Uruguay, and the integration of Brazil within ALADI?

[Sarney] The concept on which ALADI was founded in 1980 was the establishment of a flexible instrument that would permit bilateral and multilateral agreements without adherence to a timetable for reaching the final goal of a common market. This way, the new group avoided the problems that frustrated LAFTA [Latin American Free Trade Association], ALADI's predecessor.

Brazil believes in ALADI's possiblities and wants to conduct Brazilian economic and trade relations with the countries of the region in the form of associations, broadening agreements with those countries and actively participating in regional negotiations.

The integration program with Argentina and the Brazil-Uruguay economic cooperation document fall within the framework of regional integration, which is a Brazilian foreign policy priority.

These documents also represent the strong ties of friendship and cooperation which for geographical, historical, and cultural reasons unite Brazil with Argentina and Uruguay.

The Brazil-Argentina integration program emerged from the two countries' awareness that they should unite to strengthen their political redemocratization process, broaden their markets and national production, and improve the level of their products.

Brazil and Uruguay are significantly broadening the scope of the trade expansion document to obtain greater benefits from the complementarity of their economies.

The great significance of those programs, nevertheless, is the political decision that motivated them, which is based upon the desire to create new areas of cooperation and exchange, decisively overcoming any feeling of competition among countries. These agreements are a sign of political maturity, they are the result -- in my opinion -- of the full implementation of democracy in the three countries.

[PRENSA LATINA] There has been insistent talks of the possibility of creating a joint strategy to improve the deteriorating situation in international sugar prices, as well as possible Cuban-Brazilian agreements in other areas. Do you care to discuss these subjects?

[Sarney] Brazil and Cuba, along with Australia and the EEC, have discussed the possibility of achieving -- as soon as conditions are right -- a new international sugar agreement, with economic arrangements that will allow the regulation of the market through an adequate supply administration plan and the establishment of prices profitable for exporters and equitable for consumers.

This agreement would be a substitute for the existing document, which is administrative. It would, thus, contribute to the correction of the serious and extensive distortions observed in the international sugar trade: large surpluses and extremely low prices.

In this regard, the agreements made have been advantageous, even at an experimental level, for Brazil, Cuba, Australia, and the EEC, which have tried to seek lasting solutions for the worldwide sugar crisis. As is well known, the current crisis of the international sugar market is, to a great extent, the result of the protectionist measures adopted by some producers. These measures consist of an onerous and artificial protection of our national producers, which has caused a drastic reduction of imports, the use of sugar substitutes, and a considerable increase in worldwide supply with the application of large export subsidies. In response to this adverse situation, Brazil and Cuba are trying to create a mechanism capable of contributing to the restructuring of the worldwide sugar market and to great stability.

[PRENSA LATINA] If a meeting of Latin American presidents is held, what political-economic topics would Brazil prefer, and how would it evaluate the meeting?

[Sarney] A meeting of Latin American presidents would demand in-depth preparation, an expressive and clearly defined preparation in deference to the urgent interests of all of the participants.

The possibility should be carefully studied and decided among the Latin American presidents so the decision made can be effective, have historic dimensions, and represent a real contribution to the continent's social, political, and economic progress.

[PRENSA LATINA] Sources linked to NATO have discussed on several occasions the possibility of creating a military pact in the South Atlantic similar to the North Atlantic pact. What is your country's position on this issue?

[Sarney] The idea of creating such a pact has been overcome, and it was always opposed by Brazil, which considers an initiative of that nature an attempt to transfer to the South Atlantic tensions and conflicts that have nothing to do with the region, and it would protect illegitimate South African interests. I also believe Brazil's firm opposition to that idea was a decisive factor in its failure and its dismissal on the international panorama.

Counting on the strong support of the international community, and especially with that of the countries in the region, Brazil, in keeping with its position, has just proposed that the United Nations declare the South Atlantic a peace zone (which was approved by an overwhelming majority. Editorial note) free of tensions and strategic or ideological conflicts from other areas, and reserved for cooperation among the countries of the region. This initiative shows Brazil's concern regarding concrete initiatives in favor of disarmament and international detente, especially regarding the South Atlantic, which washes more than 7,000 km of Brazil's coasts.

[PRENSA LATINA] The African countries are a natural Brazilian market for historical and geographical reasons. What are your views regarding Brazilian economic cooperation with Africa?

The prospects of economic cooperation between Brazil and Africa are very favorable. Brazil and the African countries were able to build a relationship based on mutual interest without hegemonic pretensions or whims of leadership. We have much to offer Africa. The Brazilian Government understands that the willingness of national companies to transfer and license technology and the interest of training workers who are involved in projects and adjusting their tropical technology to the weather and socioeconomic conditions favor Brazil in promoting an expansion of economic relations with Africa.

We have seen that in the exports of services, Brazil has tried to emphasize the advantages of Brazilian "know how" [preceding two words in English] by adopting an intermediary technology that can be adopted to the needs of underdeveloped countries, including their environmental and cultural conditions. The expansion of the sectors in which Brazil serves several African countries shows the success of the work done by Brazilian firms on that continent and shows the promising possibilities that are opening up in the future.

There are many examples, and they include contracts for oil exploration, telecommunications, agroindustrial companies, construction of railroads and roads, installation of cement factories, production of steel, sugar, beverages, and furniture, assembling cars, etc., in Nigeria; the training of literacy technicians in Mali; oil exploitation and the reorganization of hotel chains in Angola; and the construction of ports and roads in Gabon, Congo, Tanzania, Mauritania, and Ivory Coast, among many others.

Regarding trade relations, in strict terms, we must point out that there was a great increase in the 1970's as a result of coordinated action between the government and businessmen in search of commercial opportunities in African countries. This Brazilian effort was positively praised in Africa because it met the needs of the countries of that continent to reduce their dependency on industrialized countries.

The statistics on the trade relations between Brazil and Africa show, in summary, a continuous increase and a balance of payments almost in equilibrium. In view of these figures, we can conclude that the Brazilian economic approach to Africa is a success, that there is still a huge amount of ground to be explored, and that the prospects for expansion are favorable -- all this without mentioning the fact that we have maintained a good political dialogue with those countries and that we have maintained a beneficial cooperation in other areas, such as the formation of human resources and the cultural and educational exchange, thanks to the deep bonds that unite us with Africa.

The Brazilian Government has firmly condemned apartheid at every opportunity -- at the multilateral level by supporting UN resolutions, and at the bilateral level by issuing joint communiques and other documents.

The effective pacification of the area can only be reached in the long term when the people and government of South Africa abolish the racial discrimination system that prevails in that country.

In this context, the Brazilian Government has decided to systematize, through the presidential decree of August 1985, restrictive measures and sanctions that have been adopted in its relations with South Africa. These sanctions include the prohibition of cultural exchanges, artistic or sports exchanges, the banning of exports of weapons to South Africa and Namibia, and the banning of the sale of oil and fuels to South Africa.

[PRENSA LATINA] Your government's position rejecting apartheid in South Africa and its stand regarding Namibia's independence is supported in Africa and the rest of the world. What do you think the international community should do to put an end to apartheid?

[Sarney] Brazil views the increasing deterioration of the situation in southern Africa with concern. According to the Brazilian view, the main source of tension for this situation is the continuation of the anachronistic and unjust apartheid regime in South Africa. This regime is responsible for the domestic repression and the external aggression launched by the South African Government.

Regarding the question about what the international community should do to put an end to apartheid, the Brazilian delegation that participated in the UN World Conference on Sanctions against South Africa held in Paris in June was told to vote in favor of sanctions, and it promoted, in close contact with the African delegations, support for initiatives that facilitate the negotiation of deep and effective changes in the apartheid regime. On many occasions we also condemned strongly the aggressions against the countries that border South Africa, particularly Angola, where their development and social progress are still being threatened by the actions of groups that are trying to destabilize the Angolan Government with foreign support.

In addition, the Brazilian support for the immediate decolonization of Namibia remains unchanged. Brazil condemns South Africa's prolonged and illegal occupation of Namibia. Brazil defends the immediate independence of Namibia in line with the pertinent UN resolutions, particularly Security Council Resolution No. 435/78. It also rejects any links between Namibia's independence and the withdrawal of Cuban troops from Angola.

Brazil feels that this is a matter which is extraneous to the issue. It rejects the so-called "provisional government" which South Africa installed in Namibia in 1985. It emphasized that the United Nations is the only organization authorized to administer the territory and gives full legitimacy to the struggle of SWAPO [South-West African People's Organization] for independence.

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CSO: 3699/27

LATIN AMERICA/TECHNOLOGY TRANSFER

VEJA CONSIDERS AMENDMENTS TO INFORMATICS LAW

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[Text] Before the end of the year, the government must successfully wage two battles on the economy's external front before it can calmly tackle, on 1 January the problems which are besetting the Cruzado Plan. The most controversial discussions refer to the contentious issue of the reserved market, established by the informatics law, which have been going on between Brazil and the United States. On this subject President Jose Sarney's important advisers have been feeling better this past week. The other external issue, which refers to the renegotiation of Brazil's foreign debt, still faces problems. Signs of progress on the reserved market problem, which the White House considers detrimental to the U.S. commercial interests in Brazil, was given the go-ahead by the two parties to hold a fifth round of negotiations, this time in Brussels on 13-14 December. This will possibly be the last meeting before the deadline established by President Ronald Reagan to reach an agreement on this matter. If that agreement is not reached by 31 December, the U.S. Government will retaliate with commercial sanctions against Brazilian exports to the United States.

The Brussels meeting, which will be conducted by Paulo Tarso Flexa de Lima for Brazil and by the Office of the U.S. Trade Representative for the U.S., is expected to reac "a positive understanding," according to an adviser to President Sarney. Since th last meeting in Paris last August, the Planalto Palace has been consulting with th most representative Brazilian industrial leaders as to how they would feel abou changing Article 12 in the informatics law, which is the main stumbling block today t agreement with the Americans. The interpretation that a foreign partner in a nationa enterprise in the electronics sector cannot supply technology, made by the Specia Informatics Secretariat (SEI) is based on Article 12 of the informatics law. Th results of the consultations, which still continue, came as a surprise to th government: Most of the Brazilian industrialists, just like the Americans, fir Article 12 to be the main stumbling block in the modernization of the country' industrial establishment.

That evaluation coincides with that of various sectors of the government. "Th informatics law, if it is badly administered, will act as a strait-jacket hindering th country's industrial progress," affirmed Industry and Commerce Minister Jose Hug Castelo Branco. In turn, one of Finance Minister Dilson Funaro's main advisers says "The reserved market, as it stands now, is a factor of backwardness, not of progress." He adds: "That will change, it is changing already, and the changes are not made t please anyone, but to exclusively help the nation's interests." This opinion is share by some Brazilian computer manufacturers, who are the main beneficiaries of th reserved market protection. In open forums, they have taken the position to harde

negotiations. But in closed offices in Brasilia, they admit that now is the time to adopt a more flexible position. The government is waiting for the next few days for the pronouncement by one of the country's most important businessmen's associations as to whether the reserved market should be maintained while opening channels for association with foreign capital.

In agreement with the majority, the government is now studying ways to change the Article 12 of the informatics law. Should there be an impediment in reinterpretating it without congressional consent, the government already has a solution. The idea is to permit the creation of consortiums in the computer sector with the participation of Brazilians and foreigners -- resembling those consortia which were formed to undertake public projects. In the computer sector, a consortium would result from Brazilian capital with a foreign company which will underwrite part of the stocks and will, above all, contribute with technology. The consortium's foreign partner, however, will have to commit itself to develop technology jointly with the Brazilian partner in Brazil. Since the consortium is juridically different from the type of association contemplated in the informatics law, the consortium will not pose any legal impediment to associations between Americans and Brazilians, as both the U.S. companies and the FIESP [Sao Paulo State Industrial Federation] and the Abinee [Brazilian Electro-Electronic Industry Association] desire. The government now intends to send to Congress, which will hold special sessions before it recesses on 5 December, the copyright bill on software, to settle this matter before the Brussels meeting in mid-December.

"To modify Article 12 of the informatics law will be an intelligent measure which the government is expected to take at this time," said Ivo Hering, president of the Hering Group from Santa Catarina, which is awaiting the green light from the SEI to conclude negotiations for an association in telecommunications with the FRG Siemens conglomerate. Ivo Hering says: "We cannot continue to keep Brazil closed, because we run the risk of becoming less competitive and less efficient in important production sectors." However, he believes that changing Article 12 of the informatics law is not sufficient, and points out that even as majority stockholders, Brazilian open capital corporations are not allowed to associate with foreign enterprises. "This does not make sense," says Hering.

Before it can get Article 12 of the informatics law to be modified [by Congress], the government will have to overcome some resistance to change within its own circles. The strongest resistance is located in the Science and Technology Ministry (MCT) and in the SEI, which is subordinated to the MCT. Science and Technology Minister Renato Archer said last week: "I am not interested in making accommodations in the law," adding that "the government will remain intransigent." SEI head Jose Rubens Doria Porto asserted that only Congress can make modifications to the informatics law. Then referring to the Americans' demand that the Brazilian Government release a specific list of which items in the computer field can or cannot be imported without permission from the SEI, Doria Porto said: "That story about the negative list is pure speculation." However, an agreement to the idea of preparing such a list had already been expressed in a written letter from Paulao Tarso Flexa de Lima to Clayton Yeutter, even before President Jose Sarney's visit to the United States in September. One of two things is happening here: Either Minister Archer and SEI head Doria Porto are opposed to the wishes of the government of which they are part or the government forgot to tell them what it is trying to do.

The most radical defense of Article 12 of the informatics law outside government circles is put up by the Abicomp [Brazilian Association of Computers and Peripherals Industry]. At a meeting held in Sao Paulao last week, the Abicomp pronounced itself against liberalizing the association of Brazilian enterprises with foreign capital. Of course, this association has no power to prevent the government from carrying out its plans. The president of Abicomp, Antonio Luiz Mesquita, says: "Article 12 is the key to the informatics law." Most of the Abicomp members agree. "If the first association is made, other enterprises will follow suit, and the industry will cease to be a national industry," said Flavio Sehn, president of EDISA from Porto Alegre. Prologica Vice President Carlos Gauch said: "It is impossible to have flexibility on that point, because if we do, the law will lose its significance."

The Brazilian computer manufacturers in general accept that software be protected under the copyright law, just as they agree on possible changes in the SEI structure, and on the preparation of the negative list -- the three conditions that must be met if the Americans are not to retaliate against Brazilian exports to the United States. However, the majority of the sector's businessmen are opposed to the fourth and most important condition that Article 12 of the informatics law be relaxed. They oppose this on the grounds that Brazilian industrialists from other sectors will invade the computers sector, taking advantage of their association with foreign enterprises which could provide the technology. Not only the industrialists from other sectors are plugging for those modification to Article 12, but also those enterprises which need equipment for their modernization that is only available abroad and cannot enter Brazil because of the reserved market legislation.

Last week, some reports demonstrated once again that the decisions regarding the informatics law will have to be made looking at the interests of the Brazilian economy as a whole and beyond the restricted horizon of the Abicomp industrialists. Information came from Geneva that the United States has already officially told GATT that it intends to suspend concessions on Brazilian products in reprisal for restrictions imposed by the reserved market established in the informatics law. If an agreement is not reached in the upcoming meeting in Brussels, the reprisal might become effective at the end of this year.

It was also learned last week that American Telephone and Telegraph (AT&T), the telecommunications giant, was ordered by the U.S. Commerce Department to discontinue negotiations with Brazilian enterprises over the right to use its UNIX software program. This means that the siege is closing in and that it will be increasingly difficult to prevent entry of the latest generation of products developed by the computer sector abroad. This is not necessarily a new problem. In the middle of the 4th century the bureaucracy of the Roman Empire tried to keep its citizens, through edicts, from wearing barbarian boots and pants which were more protective against the cold weather. One has only to walk down the streets to see that the reserved market is not all that impervious to smuggling.

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